No. 202 Vol. XLIII Part 4 November 1958

GEOGRAPHY

Journal of the

Geographical Association

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Arab Nationalism

A Study in Political Geography

C. G. SMITH

THE PERIOD SINCE THE SECOND WORLD WAR has seen many important political and economic developments in the Arab world, but probably the most significant of these are the recent union of Egypt, Syria and the Yemen to form the United Arab States and the union of Iraq and Jordan to form the Arab Federation.[1] On 1st February 1958 the leaders of Egypt and Syria announced their decision to form a United Arab Republic, a complete political and economic union with a single head of state, a common legislature, army and flag. It was not until 9th March that the Yemen became associated with the United Arab Republic in a federal union which is open to any Arab state. After a hurriedly arranged meeting of the two young kings of Iraq and Jordan the federal union of their two countries was announced on 14th February 1958, and it was subsequently stated that the Federation is open to any other Arab country wishing to join. There were Iraqi suggestions that Saudi Arabia and Kuwait might do so. The very timing of these events and the general appeal to other Arab countries suggests that the two unions were politically opposed. They illustrate two trends in recent Middle East history: the appeal of Arab nationalism and the rivalry of Egypt and Iraq for Arab leadership. Apart from the creation of the state of Israel just ten years ago, the political geography of the Middle East is a legacy of the peace settlement after the first world war, and it is curious that the political units created then have survived so long in view of the extremely arbitrary nature of their boundaries from a geographical no less than an ethnic and historical point of view. This paper seeks to analyse the nature and importance of Arab nationalism in relation to the recent unions, the resources and strength of the new units, and the possible character of a wider Pan-Arab union embracing all the Arab territories of the Middle East.

For present purposes the Arab Middle East is regarded as including the following territories: the former British Mandates of Iraq, granted independence in 1932; Palestine, partitioned by a resolution of the General Assembly of the United Nations in 1947 in order to create the state of Israel; and Transjordan, which became independent in 1946 and which annexed the largest portion of Arab Palestine in 1949 to become the Hashemite Kingdom of the Jordan; the former French

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Mandates of Syria and the Lebanon which were granted nominal independence in 1941 and from which French troops were withdrawn in 1946; Saudi Arabia; the Yemen; and Egypt, which became nominally independent in 1923. The British protected sheikhdoms of south and southeast Arabia—Kuwait, Bahrein, Qatar, Trucial Oman, Muscat and Oman, and the petty sheikhdoms of the Aden Protectorate, together with the Crown Colony of Aden—are also included since they are culturally and geographically part of the region. Their political ties with Britain date from the nineteenth century and arose through British interest in the suppression of slavery and piracy, and fear for the security of the Indian Empire; until after 1918 their external relations were more a concern of the British government in India than of the Foreign Office.

Since the days of the Arab Revolt against the Turks during the first world war Arab unity has been the dream of Arab politicians and intellectuals.[2] To-day under the influence of the popular press, the radio and cinema its appeal goes much deeper and the masses in the Arab world are influenced by it. The attitude of the Arab states to Israel was perhaps the first proof of the extent to which Pan-Arab sentiment transcends local issues which have arisen within each country and the often divergent foreign policies of individual Arab rulers. All Arab states have consistently refused to recognize Israel, and this involves closing their boundaries with her to the transit of people and goods. Their attitude has remained firm for ten years. Because the Arabs regarded the partition of Palestine, in their eyes an Arab country, as an injustice they opposed this in the United Nations in 1947, tried to prevent the establishment of Israel by attacking her in 1948, and have ever since demanded the return of the Arab refugees to their homes and modifications of the existing boundaries of Israel. On this issue the attitude of Iraqi politicians and people is as unyielding as that in Syria and Egypt. The unco-ordinated nature of the Arab attack on Israel in 1948, its military failure which in fact led to Israel enlarging her territory, and the piecemeal signing of armistice agreements with Israel revealed to the Arabs the consequences of their lack of unity. The lessons of the Sinai campaign of 1956 and the Suez incident were very similar.

The great differences of wealth between those Arab states with oil resources and those with little or none is a further reason why Syria, Lebanon, the Yemen, Jordan and Egypt might welcome union. The seeming inequity of oil distribution is increased by the absurdity of the present boundaries between Arab states. Thus tiny Kuwait, with a population of some 200,000, receives slightly more in oil royalties than Saudi Arabia and considerably more than Iraq which have populations 35 and 25 times larger. The small sheikhdom of Qatar with a population of some 35,000 receives more oil royalties than Egypt, Yemen or Syria. However, it should be recognized that these oil-rich states, once in receipt of the benefits of political and economic independence, have a vested interest in maintaining the *status quo*. Saudi Arabia, Iraq and Kuwait have their development projects, and have become accustomed to spending their royalties in various ways, and they will naturally be reluctant to cut their own spending and investment in the interests of Syria, Egypt, the Yemen or Jordan. It is now reliably reported that Saudi Arabia is two years overdrawn on its royalties in any case! One of the important consequences of the Jordan-Iraq union could be a common budget whereby Jordan shares the benefits of Iraq's oil wealth. Similarly Syria might eventually gain some benefit from Suez Canal dues if these are not all absorbed in financing improvements to the Canal and building the Aswan High Dam. There are thus obvious political and economic motives for a closer association of Arab states than the existing Pact of the Arab League, which, since 1945, has been the only formal link between the independent Arab states of the Middle East.[3]

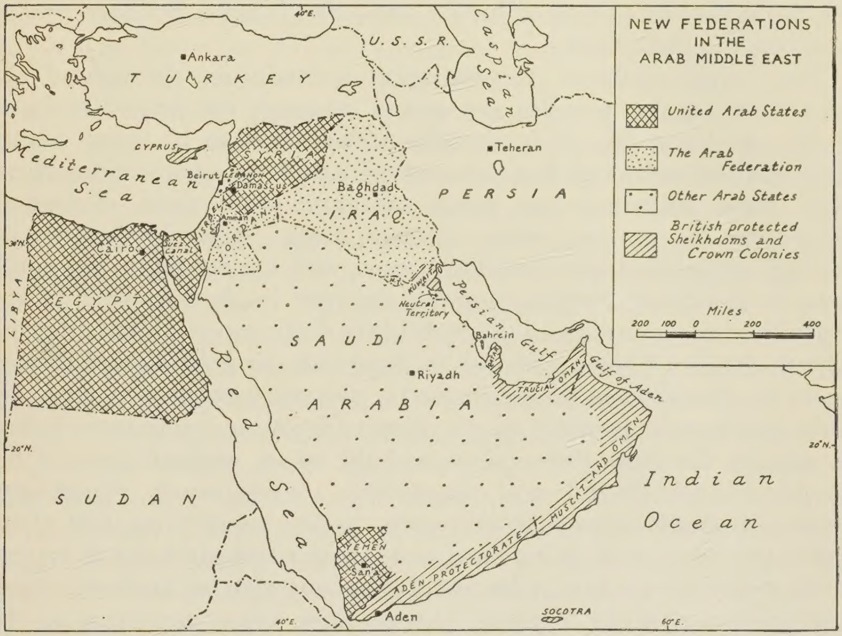

Fig. 1.

History, geography, language, culture and to a large extent religion[4] encourage a closer union of Arab peoples. The Arab conquests of the seventh and eighth centuries of the Christian era spread the Islamic faith and the language of the Koran from the Atlantic to the gates of India, and for a brief period this whole area was united in a theocratic state ruled from Damascus and later Baghdad. Islam extended into areas far beyond the region where the Arabic language took root, but after the first glorious period of Arab history political and religious differences arose within the Arab world so that it has never been united again, save under foreign rule. From the eleventh century the Arabs were in retreat first against the Christian West, and later the Ottoman Turk. Even the brief revival of Arab power under Saladin in the late twelfth century united only temporarily the Levantine portion of the Arab world, although it was powerful enough to prevent the Crusaders maintaining a foothold in Palestine. Shortly afterwards the greater part of Mesopotamia and the Fertile Crescent was ravaged by the Mongols, and so thoroughly devasted that it never really recovered until the present century.

The broad similarity of geographical conditions throughout the area where Arabic remains the spoken language has helped to foster similar modes of life. It is true that differences can be found within each political unit, and that the territories differ to some extent. However, these differences are small compared with unity of human geography in an area where climate grades from Mediterranean through steppe to desert conditions; thus, with the exception of a small area in southwest Arabia, summer drought is characteristic of the region and the winter rains are variable in their nature and incidence.[5] The traditional human response to these climatic conditions has been pastoral nomadism in the desert and a peasantry either dependent on unirrigated grain farming on the desert fringes or intensive irrigated farming in the great river valleys and the better watered areas of the Mediterranean littoral and mountains. Winter-sown wheat and barley, irrigated crops such as cotton, maize, sugar cane, and citrus fruits, tree crops such as the olive, nut, apricot and plum are as typical of the region as the date palm and the beduin with his herds of camels and goats and flocks of sheep. Large cities, often important in the past as caravan centres such as Aleppo, Damascus, Mosul, Baghdad and Cairo, are usually located on the desert margins or in the centre of some intensively irrigated area. The large seaports, such as Beirut, Alexandria, Basra, Port Said and Suez, have become relatively more important in recent years and show more western influence as a result of the modern expansion of trade.

Recent economic and political developments are rapidly changing the human geography of the Arab world, but the nature and impact of these changes are common to much of the region. Those Arab countries which are not large producers of petroleum are concerned with its transit and refining, and the search for oil continues in all of them. New irrigation works are under construction or projected on such rivers as the Orontes, Jordan, Litani and Khabour as well as the great rivers, the Nile, Tigris and Euphrates, where there are already large modern schemes. To-day the beduin, once regarded as the only true Arabs,[6] are dwindling in numbers under the attraction of regular wages in the oil fields and the discouragement of their traditional occupation, tribal raiding, by closer and effective policing of the desert. Everywhere governments are attempting to settle the beduin by means of land reclamation and irrigation schemes. The traditional social and economic system of the region is undergoing a rapid transformation, some of the effects of which are inevitably unpopular and disturbing. Foreign occupation and economic development have aroused a sense of injustice and a feeling of technical inferiority relative to the West; and in response the Arabs seek strength through unity.[7] The numerous conquests and migrations which have occurred in the Middle East make it difficult to justify the notion of an Arab race on the grounds of physical anthropology, but one can define an Arab in terms of language and culture, as a person who speaks Arabic and feels that he belongs to the Arab nation. However, partly as a result of political division in recent years separate local national movements have grown up particularly in Egypt, Syria, Lebanon and Iraq, and these may be a stronger attraction and often in conflict with the wider Arab unity. These local nationalist movements are not merely a result of political boundaries imposed on the Arab world by western statesmen, but are rooted in Arab history. The present struggle between the Nile Valley, Mesopotamia, Syria and Arabia for leadership of the Arab Middle East can be paralleled many times in history, as can the present relationship of the Arab countries to their northern neighbours Turkey and Persia. The seat of the Caliphate, or supreme temporal power in the Arab-Islamic state, moved successively from Medina to Damascus, Baghdad, Cairo, and finally to Istanbul after the Ottoman conquest of Arab Asia. The separation of the limited areas of high fertility by large tracts of barren desert has made the maintenance of political unity difficult; while external pressure from Europe or Central Asia has successively threatened the isolated centres of Arab civilization—Mesopotamia, the Nile Valley, the Syrian portion of the Fertile Crescent, and the Maghreb—and has thus contributed to disunity and weakness in the Arab world.

The post-1918 political settlement in Arab Asia imposed for the first time rigid boundaries on the European model in an area which had previously been divided by broad desert frontiers where the beduin owed allegiance only to his tribal leader. In themselves these new boundaries gave rise to complications and anomalies for they cut the caravan routes and interfered with grazing and water rights. However, with the discovery of oil and the grant of concessions to foreign oil companies these boundaries have made enormous differences to the wealth of individual states. Thus the inclusion of the former Turkish vilayet of Mosul in Iraq prevented Syria obtaining a share of the oil. British protection of Kuwait and Qatar, at a time when their oil wealth was undiscovered, and their boundaries undemarcated, has helped to create even greater anomalies and led directly to the peculiar position of the oil concessions in the Kuwait-Saudi Arabian Neutral Zone. But for the recognition of British interests by Ibn Saud these territories would probably, like the Hejaz, have been incorporated in Saudi Arabia. The prospects of discovering more oil, and the growth of Arab nationalism, in the Yemen and Saudi Arabia are likely to produce frontier incidents along their undemarcated boundaries with the British-protected sheikhdoms and the Aden Protectorate.

The two recent unions are of interest from the standpoint of political geography in that they each unite a portion of the classical region of Greater Syria with one of the two largest centres of population and resources, the Nile Valley and Mesopotamia. After 1918 Greater Syria was partitioned into four separate territories: Palestine, Transjordan, Lebanon and Syria. While the boundaries between these territories bore some resemblance to historical divisions they also produced many anomalies and difficulties, which have been made much worse where portions of the present Israel boundary have been inherited from Palestine.[8] Historical boundaries in Greater Syria were often merely provincial divisions of a large empire, and in this way Palestine takes its name from the Roman province of *Syria Palaestina*. With four Arab states and Israel occupying the classical territory of Syria its political geography bore some resemblance to that of the Balkans before 1914, but the recent unions have hardly improved matters. The way in which the unions have occurred underlines the importance of political rather than geographical factors. It would have been more natural for Syria to unite with Iraq, since they share the Fertile Crescent and the river Euphrates on which both have elaborate irrigation projects but no agreement for a division of the waters. While Jordan does have a common frontier with Iraq, and may well benefit from union, it would have been more natural for her to unite with Syria. Egypt is separated from both Syria and the Yemen, and does not have much in common with either state. Immediately after the formation of the United Arab Republic it was difficult to imagine how Jordan could remain outside it for her accession would have left only the tiny strip of Israel territory at Elath on the Gulf of Aqaba as a barrier to direct communication between Cairo and Damascus. The distaste of Jordan's rulers for Colonel Nasser's brand of union and the family ties of the Kings of Iraq and Jordan seem to have been the determining factors in the formation of the Arab Federation. It is significant that the flag of the Federation was that of the Arab Revolt which was led by Lawrence and the Emir Feisal, the first king of modern Iraq. Feisal was the son of Sherif Husain of Mecca, the great grandfather of the kings of Iraq and Jordan. Husain was evicted from his kingdom of the Hejaz in 1924 by Ibn Saud, the creator of the kingdom of Saudi Arabia and father of the present king. The family feud between the Saudi dynasty and the Hashemite rulers of Iraq and Jordan may be a reason for the reluctance of Saudi Arabia to join the Federation, but there have recently been many signs that this dispute has lost its fire. The accession of Saudi Arabia and Kuwait to the Arab Federation would be an alliance of the traditional ruling order against republicanism represented by the present one-party system in the Arab Republic. It is a very curious paradox that the extremely backward and patriarchal state of the Yemen has joined, or at least been associated with, the Arab Republic, although apparently with some reservations on the part of the ruler of the Yemen. Although the Lebanon was a founder member of the Arab League, and Lebanese intellectuals have often been active in Pan-Arab movements, the position of that country is anomalous. It is the one Arab state with a slight Christian majority,[9] and the country which has been most profoundly affected by European culture and economic development. As a centre of exchange and trade, and by its possession of the most important civil airport in the Middle East it has much to gain by not identifying itself with either union. However, it is unlikely that it could or would wish to remain outside a single Arab state.

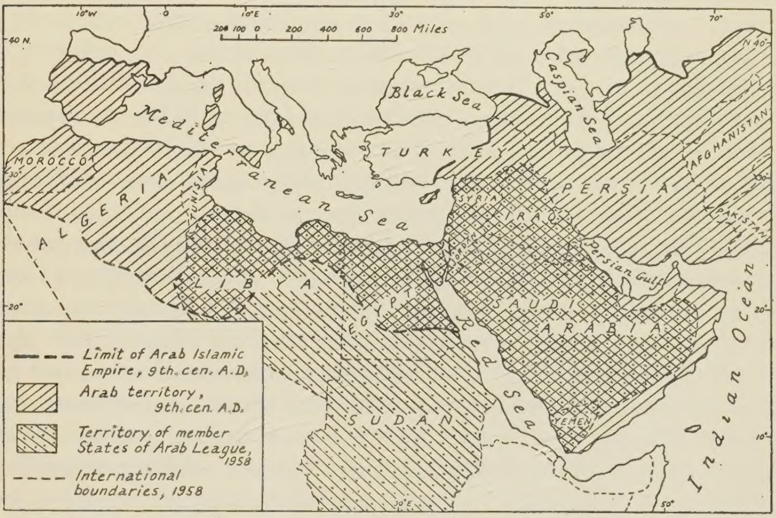

Fig. 2.—The Arab Empire at its greatest extent under the Abbasid Caliphs, ninth century A.D.; and the Arab League States to-day.

Neither of the two new unions is a union of equals. In terms of population Egypt dominates the United Arab States for her population of over 23 millions contrasts with an estimated four and a half million persons in the Yemen, and just under four millions in Syria. Similarly Iraq's population of some six and a half million is much greater than Jordan's one and a half million, nearly a third of whom are in fact refugees from Arab Palestine whose homes are now within Israel. In other respects Iraq and Egypt also overshadow their partners in each union. The actual and potential natural resources and wealth of Iraq are much greater than those of Jordan. In 1956 Iraq produced over 31 million tons of petroleum and received nearly £70 million in royalties from I.P.C. Approximately two-thirds of these royalties are spent on development projects by the government and the Iraq Development Board. Much of the money has gone on irrigation schemes and flood control works, but considerable amounts are now being spent on industry, transport, education and medical services, and housing. Land reform, which is very necessary, has so far made slow progress but it is planned to finance this from the royalties. Iraq is almost as well supplied with water for irrigation and power as Egypt, and has a larger area of land which can readily be converted to irrigated farming. Seen purely in terms of water and land there should be no difficulty in cultivating all the land Iraq is likely to require for the next twenty or thirty years. On the other hand, Jordan has a very limited area of cultivable land, and a much smaller area which might be irrigated. Most of her cultivable land is already in use and almost all the potentially irrigable land is in the Jordan valley and must use the waters of the rivers Jordan and Yarmuk. Both these rivers form in part her boundary with Israel or Syria, and the agreement and co-operation of these countries are required for their effective use. It has so far proved impossible to reach an agreement with Israel, and while there is an agreement with Syria over the Yarmuk its implementation may prove difficult now Syria is part of a rival union. Jordan's natural resources are extremely limited and she has the additional burden of the refugees. Her boundary with Israel is longer than that of any other country, and the unstable state of this border has involved heavy military expenditure. It is not surprising that from 1949 to 1956 the state relied on a British subsidy of £12 million a year to balance its budget. Since 1956 this has been replaced by a Saudi Arabian subsidy and grants from the United States but it is likely that the former will now cease and Iraq will have to shoulder the burden. The contribution would need to be increased if Jordan's development spending is to match that of Iraq.

In the case of the United Arab States there is a great contrast between the relatively advanced countries of Egypt and Syria and the primitive backward Yemen. Egypt is the most industrialized of the Arab countries, but of recent years Syria has shown a very fast rate of economic growth so that, with the possible exception of the Lebanon, her living standards are the highest in the Arab world. Since 1945 Syria has more than doubled her cultivated and irrigated areas and as a result she has become in most years a substantial exporter of agricultural products, particularly wheat, barley, cotton and fruit. There appears to be considerably more potentially cultivable and irrigable land in Syria than in Egypt, where there is already a very high ratio of population to cultivated area and acute problems of rural over-population, low living standards and land hunger. Unless

Egypt's population problem is relieved by birth control, emigration, or more industrialization the completion of the Aswan High Dam will only enable enough land to be irrigated to cope with her increased population by that date. Unlike Syria, which as yet is in the first stages of industrial development, her domestic market is limited by the very low purchasing power of most of her people. There is a possibility that Egypt's population pressure might be relieved by some emigration to Syria where both land and water are more abundant, but the Egyptian fellahin have always been reluctant to leave the Nile valley. On the other hand, there has been a substantial emigration of Syrians to the U.S.A., South America and West Africa in the past, and there may well be a migration of artisans, merchants and professional classes to the towns of Egypt such as occurred on a small scale before union. None of the countries comprising the United Arab States have resources comparable with Iraq's oil wealth. Syria and the Yemen produce no oil, but there are exploring concessions in the Yemen, while in 1956 Syria earned £6,500,000 in royalties on the pipelines which cross her territory. Egypt has for many years produced about 2 million tons of petroleum annually, but this is scarcely enough for her own requirements. Thus while Jordan and the Yemen should eventually stand to gain by union with wealthier and more developed countries, it is difficult to see what Syria will gain unless it is a larger market for her agricultural products and capital investment by Egyptian industrialists. In view of her prestige and greater military potential Egypt is likely to find the union making greater demands on her military budget as a result of the unification of the armed services of the three countries.

The recent unions illustrate the appeal of Arab unity, but they also suggest that this has not yet transcended local national feeling nor the different political and economic interests of various Arab rulers. What are the chances of a wider union of all the Arab Middle East and what would be its strength?

In some respects the new unions have made the political division within the Arab world much clearer. Egypt, Syria and the Yemen have all recently pursued policies in some measure hostile to the West and have received economic and military aid from Communist countries.[10] While Iraq is the only Arab country formally linked through the Baghdad Pact[11] with the western system of alliances, Jordan, Saudi Arabia and Lebanon have welcomed the Eisenhower Doctrine. The smaller countries such as Kuwait, Qatar, Bahrein and the other sheikhdoms are closely linked with the United Kingdom as Protected States; their administrative and military services are partly officered by Britons, so that together with Aden Colony and Protectorate they represent the last formal relics of British control in the Arab world. It is surely significant that the major oil-producing countries of the

Middle East, Persia, Iraq, Saudi Arabia and Kuwait have agreements with Britain or the U.S.A., which would be incompatible with the present foreign policy of the United Arab Republic. For instance, the U.S.A. still has an air base at Dhahran in Saudi Arabia under an agreement first concluded in 1944 and last renewed in 1957. Short of changes of government in several countries, or a real crisis in their relations with Israel, further unity seems unlikely in the near future, in spite of its appeal on geographical, cultural and economic grounds.

The Arab Middle East has a total population of about 50 millions, of of whom 32 millions are already included in the United Arab States. Some 10 million people remain outside the two new unions, of whom about 7 millions are in Saudi Arabia, 1·4 million in the Lebanon and about 2 millions in Aden and the British protected sheikhdoms. Arab nationalists, notably Colonel Nasser, often talk of the Arab world as stretching from the Atlantic to the Persian Gulf. There are about 1 million people in Libya and 23 millions in Algeria, Tunisia and Morocco, the overwhelming majority of whom are Arabic-speaking Moslems. In view of the vast area of scanty population between the Nile Valley and Tunisia, and the close economic connections between the Maghreb and France, it is difficult to envisage an association of northwest Africa with the Arab Middle East until the latter area is itself united.[12]

For the last four years the Arab Middle East has produced an average of 20 per cent of the world's petroleum. However, during the last two years its percentage share has fallen slightly due to the rapid recovery of Persian output following the setting up of the International Oil Consortium which buys oil from the National Iranian Oil Company. For some years it has been usual to credit the Middle East with between 60 to 70 per cent of the world's oil reserves. The latest figures credit the Arab Middle East with about 50 per cent of world reserves outside the U.S.S.R. This figure is in fact less than estimates of a few years ago, and it is likely that this proportion will decrease as further exploration in the Libyan and Algerian Sahara, and possibly in Canada and Southeast Asia, reveals the extent of discoveries there; but because of its very favourable ratio of annual production to known reserves the Middle East looks like remaining an important source of oil, and the main source for Western Europe, for years to come. It is often concluded from this that Middle East states are in a very powerful political bargaining position. However, the converse may well be the case. Oil production and royalties will become essential for Middle East countries if their development spending is to be maintained. Provided the consuming countries have access to alternative sources of oil and energy it is the producing countries which will suffer most from a repetition of such events as the Persian oil nationalization of 1952 and the Suez crisis of 1956. It is possible that realization of this fact is in part responsible for the difference between the foreign policies of the United Arab Republic and the oil-producing states. The lessons of 1952 seem to have been learnt in Persia and Iraq no less than in Britain.

Apart from oil the region is very poorly endowed with minerals. Egypt produces about 2 per cent of the world's phosphates and there are useful supplies in Jordan which are now being developed. The Dead Sea is rich in mineral salts, particularly potash, but Jordan has so far been unable to develop them, whereas Israel, which is far better placed for export, has done so on a large scale. Otherwise apart from a limited supply of high grade (50 per cent iron content) haematite ore near Aswan in Egypt and some gold in Saudi Arabia mineral deposits are insignificant.

Manufacturing industry has as yet only developed on any scale in Egypt and Lebanon, but Syria and Iraq are now beginning to follow the same pattern. Textiles, particularly cotton, food and drink, glassware, tobacco, cement and light engineering are the most important factory industries. There is much traditional "bazaar-scale" industry of high quality, but this is declining in the face of competition from factory-made articles. There is an important film industry in Egypt, which has a near monopoly of Arabic films, and this has done much to increase Egyptian influence in the Arab world, particularly by popularizing the Egyptian form of colloquial Arabic.

In spite of its large area of desert and steppe the Arab Middle East does not possess an unfavourable ratio of population to cultivable or irrigable land. This may be surprising in view of the considerable population pressure in Egypt, but the large area of irrigable land available in Syria and Iraq should not only be sufficient to support the growing population of the region, but should also enable the present exports of cotton, wheat, barley, fruits, wool, hides and skins to continue.

Table I gives in summary form the proportions of cultivated and irrigated land available in various Middle East countries for which reliable figures are available. The estimates of cultivable and irrigable

Table I

ACTUAL AND POTENTIAL CULTIVATED AND IRRIGATED LAND IN THE MIDDLE EAST (AREAS IN ACRES)

Country	(a) *Cultivated area*	(b) *Cultivated area as per cent of total area*	(c) *Estimated area cultivable in addition to* (a)	(d) *Cultivable but not cultivated as per cent of total area*	(e) *Total area at present irrigated*	(f) *Irrigated area as per cent of cultivated*	(g) *Estimated area irrigable in addition to* (e)
Egypt	6,067,000[a]	2·4	1,335,000	0·5	6,067,000	100	1,335,000
Syria	9,880,000	22	8,650,000	19	1,460,000	14	680,000
Iraq	15,776,000[b]	14	4,942,000	4·5	7,296,000	46	4,942,000
Jordan	1,750,000	7	Little more	—	80,000	5	148,000
Lebanon	675,000	27	285,000	11	119,000	18	84,000
Israel	892,000	18	865,000	17	247,000	27	618,000

[a] About one-third of this land was fallow in the crop year 1952–53.
[b] 44 per cent of this was estimated to be fallow in the crop year 1952–53.

areas are based on the most reliable figures furnished by U.N. Agencies in the Middle East, but these can only be a rough guide to future development. It is not possible to quote very reliable figures for Saudi Arabia and the Yemen but these two countries are in the main self-sufficient in foodstuffs, albeit at a low living standard. There is an export of coffee, hides and skins from the Yemen, but Saudi Arabia imports fresh fruit and vegetables by air for the foreign and local residents of the oilfield area. The much vaunted modern farming scheme at Al Kharj more or less functions as the kitchen garden of the royal palace and the scheme is quite small.

Arab unity should enable these actual and potential economic assets to be utilized more effectively. The increased trade which should result from closer union would enable greater specialization in each part of the Arab world and produce a better balanced economy than for instance the present reliance on cotton in Egypt and oil in Kuwait and Saudi Arabia. At present there is much duplication of effort. Iraq is doing a great deal with her vast resources, Kuwait cannot effectively use them all within her limited area, Saudi Arabia is doing little that is effective, Egypt is trying to do too much with limited resources and too many people, while Syria and Lebanon have both done very well without oil resources in their own territory. Further development of irrigation, industry and transport within the region will require substantial capital. In order to obtain this without being too dependent on either Western or Communist aid, Arab countries must continue to develop their two chief assets, oil and agriculture. Unless it is brought about in conditions of violent social revolution land reform will also require considerable expenditure, and without land reform the benefits of increased irrigation will not raise the living standards of the mass of the rural population. In many countries land reform and irrigation could only be carried out by first increasing the efficiency and effectiveness of the administration, which means more higher education, and more political attention to domestic problems. It is a pity that the energies of Arab politicians are not more attracted to the duller issues of land reform, education, and irrigation rather than to the burning questions of Palestine, Aden, the Baghdad Pact and Communism.

An Arab state of 50 million people occupying such an important strategic region as the Middle East, and controlling the great oil resources, could be an effective power in world affairs. There is no reason to assume that it would necessarily be anti-western or anti-British. There should then be less reason for the Arabs to feel alarmed at the prospect of Israel attempting to extend her boundaries or of foreign intervention in their internal affairs. In the foreseeable future the West is likely to provide most of the traffic through the Suez Canal and to be the largest customer for Middle East oil; with these mutual interests Arab relations with the West should be much closer than with the Communist bloc. There is little or no evidence that Soviet interest in the region has the same economic basis; on the contrary it has profited from the present disunity and particularly by the Arab fear of Israel. Arab Union would be merely the logical consequence of a process begun during the first world war. By her support of the Arab Revolt Britain was largely responsible for the modern development of Arab nationalism. This was not then considered to be in conflict with British interests at a time when the main interest in the region lay in the command which it gave over the land and sea routes to India. Nor was it later when in 1932 Britain granted independence to Iraq, and thus made it inevitable that sooner or later the same should be applied to the other "A" Class Mandates: Syria and Lebanon.[13] The only reasons for the West to fear Arab nationalism are that it might be captured by Communism, or that it might become identified with Colonel Nasser's vaguely expressed and confused Pan-African, Pan-Arab and Pan-Islamic aspirations which can appeal variously to Arabism and Islam in the Maghreb, Sudan and East Africa. This raises the issue of the extent to which Egyptian interests are tied to those of the Arab world or to the Nile Valley. Egyptian nationalism developed early and only really became identified with Arab nationalism during the nineteen thirties, particularly over the Palestine issue. Geographically Egypt is linked with the rest of the Nile Valley by her complete reliance on the Nile waters, but culturally and historically her ties with the rest of the Arab world are much closer than with Africa south of the Sahara.

The latest unions in the Arab world do not give a final answer to the question of whether Egypt's leadership will be accepted by the other Arab peoples. By nature of her larger population and by her technical and cultural lead she seems destined to be the nucleus around which a modern Arab state could form; but the policies of her leader are not, it seems, acceptable in other Arab ruling circles.

During her long history Egypt has often occupied Palestine and the larger area of western Syria, but such expansion has invariably brought her into conflict with powers controlling Anatolia or Mesopotamia. In the present circumstances Iraq's rulers are opposed to Egyptian leadership. Will the personal popularity of Colonel Nasser, who identifies himself with Arab nationalism, be more attractive to the Arab peoples? Egypt, or at least the Nile Valley, is a distinct and unique geographical region, and its history and human geography suggest that it has never resolved the problem posed by its position; are its interests mainly Mediterranean, Arabian or African?

REFERENCES

[1] This article was written before the revolution in Iraq in July 1958. The new republican government of Iraq dissolved the Federation and has announced that it will follow a more independent foreign policy, but its attitude to the United Arab Republic and the

Baghdad Pact is still uncertain. There are signs that for the moment this government desires no closer association with other states than that provided by the Arab League. The position of the Iraq Petroleum Company's concessions has remained unaltered.

[2] The best account of the rise of Arab Nationalism is to be found in George Antonius, *The Arab Awakening*, London, 1938.

[3] The member states of this pact are: Egypt, Iraq, Syria, Saudi Arabia, Lebanon, Jordan, the Yemen, Libya, Sudan, Morocco and Tunisia. An English translation of the text of the pact can be found in: *The Middle East, a Political and Economic Survey*, R.I.I.A., London, 1950, pp. 471–4.

[4] The Arab states are by no means so overwhelmingly Moslem as is often thought, while there are important sectarian differences in the Moslem world itself. The numbers of the main religious groups in the Arab Middle East are shown at appendix A.

[5] This point is developed in an article by W. C. Brice, "The cycle of the seasons in the Middle East", *Geography*, vol. xxxv, 1950, pp. 102–9.

[6] Bernard Lewis, *The Arabs in History*, London, 1950, p. 12 et seq.

[7] Albert Hourani, "The decline of the West in the Middle East", *International Affairs*, vol. xxix, pp. 22–42 and 156–83, 1953, is a useful sequel to Antonius, and brings the account of the growth of Arab Nationalism up to date.

[8] C. G. Smith, "The boundaries and population problems of Israel", *Geography*, vol. xxxvii, 1952, pp. 152–63, and Elizabeth Monroe, "The Arab-Israel Frontier," *International Affairs*, vol. xxix, 1953, pp. 439–48.

[9] Some authorities question whether this is now true as the Moslem and Druse populations have a higher rate of increase than the Christian. The confused political situation, almost amounting to civil war, in the country at the time of writing is an illustration of the delicacy of the constitutional balance, and of the danger of political division on religious lines. The attraction of the United Arab Republic to some Moslem elements is only in part the cause of the trouble.

[10] It is reported that by an agreement of October 1957 the U.S.S.R. is to grant Syria loans amounting to $180 million for irrigation and railway development, while the U.S.S.R. has granted Egypt £33 million for the first stage of the Aswan dam.

[11] But see reference [1] above.

[12] Morocco and Tunisia both joined the Arab League in September 1958, but at the first meeting of the League thereafter there was a sharp clash between the representatives of Tunisia and the United Arab Republic.

[13] Under Article 22 of the Covenant of the League of Nations, Mandates (former German colonies or Turkish territory) were divided into three categories. They were regarded as being unable to stand alone in the modern world and their care was entrusted to advanced nations. Class "A" Mandates were former Turkish communities provisionally recognized as independent nations that must accept, for a time, advice and assistance from a mandatory power. Tanganyika for instance was declared a "B" Mandate, and Southwest Africa a "C" Mandate. The Mandates for Palestine and Transjordan were not strictly comparable with those for the other former Turkish territories, since that for Palestine made provision for a Jewish National Home in that country.

Appendix A

Religious Sects in the Middle East

The total population is the latest estimate for each country save in the case of Egypt and Iraq.

The figures for Lebanon and Syria are based on reliable intercensal estimates, those for Iraq are less reliable intercensal estimates, and those for Saudi Arabia and the Yemen are the most likely estimates but may have an error of as much as 25 per cent.

Country	*Total Population*	*Moslems*					*Christians*	*Jews*	*Others enumerated*
		Sunni Moslem	*Shii Moslem*	*Ismaili*	*Alawi*	*Druse*			
Syria	3,670,000 (1954)	2,703,000	15,000	38,000	410,000	118,000	490,000	32,000	3100 (mostly Yezidis)
Lebanon	1,383,000 (1954)	253,000	224,000	not enumerated		80,000	672,000	not enumerated virtually none since 1950	
Iraq	4,948,000 (1954)	2,410,000	2,300,000	not enumerated			101,000		
Jordan	1,500,000 (1954)	figures not available, mostly Sunni Moslem but some 100,000 Christians and a few Druse							
Egypt	19,022,000 (1947)	17,398,000	not enumerated				1,502,000	66,000	1500
Saudi Arabia	6,000,000 (estimate only)	almost entirely Sunni Moslem of the Wahabi Sect							
Yemen	4,500,000 (rough estimate)	Rather more than 40% are Shii Moslem of the Zaidi Sect and the remainder Sunni Moslem.							

The Town of Lecco

Urban Structure and Industrial Location in an Alpine Setting

ALICE COLEMAN

THE PANORAMA OF LECCO, between Lake Como's colourful waterfront and the dolomitic pre-alps, serves to convince the senses that tourism must logically hold a key position in the town's life. This is an impression which facts deny. Lecco has but four hotels, of which only three rank as high as third class. There is no profusion of restaurants, gift shops or places of entertainment, no prominently advertised coach tours or lake trips, and, most significant for the Alps, no cable railway to take the tourist to any of the nearby magnificent viewpoints. Lecco has done little or nothing to enhance its natural charm. What amenity investment there has been is concentrated along the waterfront to cater for day trippers from Milan and other industrial centres within an hour's rail journey, but on the whole the amenities seem little more than would be reasonable for the town's own 42,000 inhabitants.

The true *raison d'être* of Lecco is iron and steel. Of its 93 factories, 54 are concerned with metal. These range from small family businesses to a large steel works with a payroll of about 2000, while several additional factories are planned in connection with a modern housing estate. The varied components of the industrial structure are intimately related to different facets of the urban structure, and both in turn to physical basis: site influence as always in the Alpine environment is particularly cogent. This remains true even though both industry and town are caught up in vigorous modern growth. The present phase is transitional, but nevertheless interesting and significant. Lecco has hitherto been a small centre with outlying villages. Very soon it will be a single large compact unit, engulfing all the old nuclei within a

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This analysis of town growth in relation to types of industry is based upon an urban survey carried out on two days in August and September 1956, with the assistance of 65 students from the Joint School of Geography, Bedford College, and Queen Mary College, in the University of London; Bristol, Exeter and Oxford Universities; and the University Colleges of Leicester and Swansea.

The surveyors, in groups of four, were equipped with town plans, and allocated to particular districts. Buildings were mapped according to their function, and special attention was paid to industry, for which information on raw materials, power sources, water supply, labour, transport, markets and capital was sought.

The results of the survey are submitted for publication both on account of their own intrinsic interest as an example of current developments in Northern Italy, and because teachers conducting field work might be interested in the kind of urban study which "mass urban survey" can produce.

continuous modern matrix. Thus it is in direct contrast with the English town which has normally grown by a process of accretion around a single early core. Lecco instead has grown by a process of infilling among sub-equal foci, one of which has been fitted by locational advantages to assume a dominant role.

Site and situation

Italian industrialization is a modern phenomenon, and though it is responsible for Lecco's recent growth, it in no way explains its origin and development. Like many others in the Alpine-edge town family, Lecco first assumed importance from the military command of route-ways (Fig. 1). Lecco lies at a valley cross-roads a short distance within the pre-Alps. The main transverse Adda valley is crossed at an angle of 70° by a line of geological disturbance, occupied by the over-deepened Valmadrera corridor to the southwest and the high level Laorca corridor to the southeast. This same disturbance also produces a morphological change in the lake shores and on the east side has set back the dolomite for some miles leaving room for an outcrop of purple calcareous marls. These form the Lecco embayment. Thus arise three main factors which have contributed to a strategic position and subsequent town growth:

(*a*) routes were funnelled into definite channels where movement was markedly easier than elsewhere;

(*b*) a difficult passage at one point along the route permitted rigid supervision and control of movement;

(*c*) building space and a means of livelihood for the inhabitants permitted the growth of a town as well as a purely military fortress.

The first of these three factors is satisfied in Lecco by the two valleys to the south which lead routes from the North Italian Plain between the 2000–3000-feet massifs of the Southern Calcareous pre-Alps, to converge at Lecco. The point of difficult passage is double: this takes a little longer to explain.

On the north side of the structural disturbance is a tract difficult of access. Here the dolomitic walls close in upon the lake. The water is deep: it goes down 1350 feet as the deepest lake in Europe. Scree flaking from the side walls of this overdeepened glacial trough sinks deeply below the water to form a subaqueous landscape instead of softening the visible cliff angles, and this has made land traffic difficult. Both the railway and the modern roads needed careful engineering along the lake shores, while the older road looped right away through the Laorca valley and over a col to rejoin the lake some miles higher up. This sudden difficulty in the land routes just after their convergence from the south fulfils the second requirement from the strategic standpoint.

The water route shows a similar constriction but in reverse. Flowing calmly between its limestone walls, the lake is an easily navigable waterway which originally continued a further thirteen miles downstream to the terminal moraine which dammed it. The lower end has been infilled already, partly because it was less deeply scoured by the ice, and partly because, south of the line of disturbance mentioned above, it was flanked mainly by less resistant rock than the dolomite in the narrows. For example the purple calcareous shales of the lowland embayment at Lecco are more vulnerable to erosion and present softer-featured topography. The materials removed were swept down three confluent fans which have pushed out arcuate fringes and filled up much of the lake just here. So greatly has the lake been narrowed that it is termed the river Adda and provides a bridging point. A little farther downstream, however, the marl embayment ends and limestone and dolomite resume. The fans go, and the lake widens

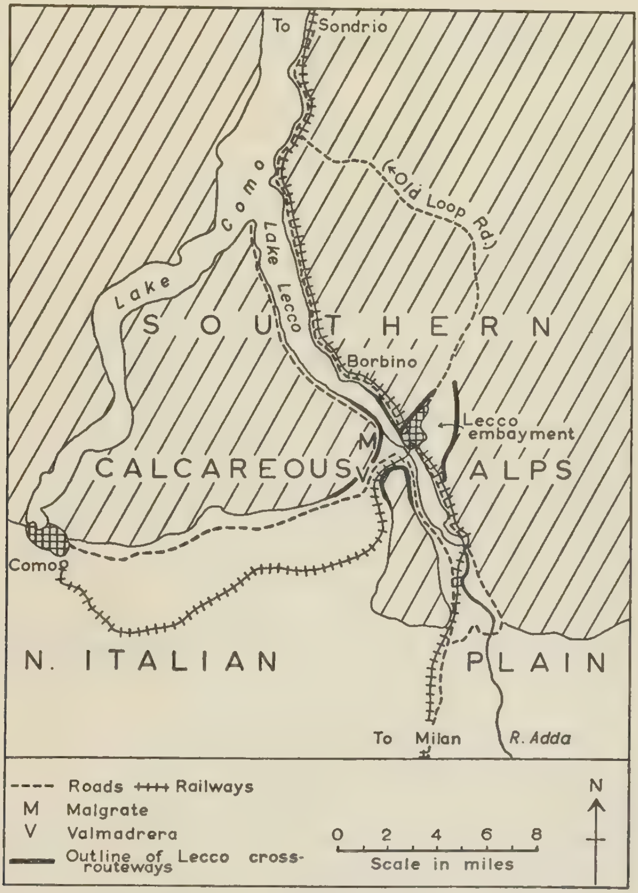

Fig. 1.—Situation of Lecco.

again as Lake Garlate. Thus the bridgepoint is not merely one among many continuing downstream, but a unique crossing point between two lakes, and this doubtless enhanced the strategic value of Lecco's site. The remains of fourteenth century fortifications are still to be seen in the town centre.

Strategic considerations rarely exert dynamic effect in a modern town but their former importance has often left an inheritance of route control. Lecco exemplifies this generalization, but with some degree of rearrangement. The old inland road loop has lost much of its importance with the coming of engineered communications along the lakeside. It is the only arm of the physical crossroads which has not undergone glacial overdeepening with subsequent alluvial or lake infill, and so it is the only one without a flat longitudinal gradient suitable for a railway. Each of the other three arms now carries a railway, Lecco being the junction for the Milan–Sondrio and the Como lines.

The marl embayment at Lecco has had other influences upon the town, stemming directly or indirectly from its greater impermeability than the dolomite, and its ability to carry surface streams. There are three main streams running down to the lake. The Torrente Gerenzone in the north is the largest, and its head forms the col at Laorca previously referred to as the Laorca corridor. The Torrente Caldone farther south is smaller and has not been able to cut back through its dolomitic headwalls, while the Torrente Sione on the south side is smaller still. Each of the three has produced a fan, and fan sites have been much in demand around Lecco. Upstream from Lecco the Borbino Fan can be seen in profile, and there one can pick out the old settlement raised well above the level of flooding and malaria, while the new buildings have been attracted downfan by modern road, rail and lake traffic. This is a very simple instance, but it sheds light on the more complex settlement of the three confluent fans at Lecco. Here, too, there are village nuclei situated well up on the fans, while Lecco itself, for strategic reasons, lay nearer the waterfront. In other circumstances perhaps another of these nuclei might have come to dominate the rest, but in view of the "gravitational pull" of the railway and modern road both roughly graded to lake level, the rise to dominance of Lecco is but a large-scale repetition of what may be seen at Borbino.

The settlement nuclei

There are altogether 13 nuclei which are being physically incorporated into, as well as culturally dominated by, Lecco. This illustrates how the anatomy of the settlement is quite different from that of a normal English town. Lecco has thirteen cores, between which interstitial growth is taking place. Because they are still separate and distinguishable they afford a good opportunity for comparison and a study of the nuances of influence exerted by relationships to topography, streams and communications. The integrated effect can be expressed in two useful ways: by the industrial character of the settlement and by its status in providing goods and services.

These villages are arranged in four lines, determined by the three streams of the marl embayment and by the lake shore downstream of Lecco (Fig. 2). They have a great deal in common—narrow winding streets between tall, close-crowding tenements on a site to one side of the stream and above its steep rejuvenation incision. The largest stream, Torrente Gerenzone, has room for five villages, while Torrente Caldone has three, and Torrente Bione only two. The purely spatial factor is reinforced by direct water-power potential. The Gerenzone could support more industry as well as having the old loop road, while each of the other two is a cul-de-sac. Thus the northern part of the marl embayment is the most heavily populated and industrialized, and it is on this side, too, that the centres have begun to be linked by ribbon development. Castello is already completely joined to Lecco.

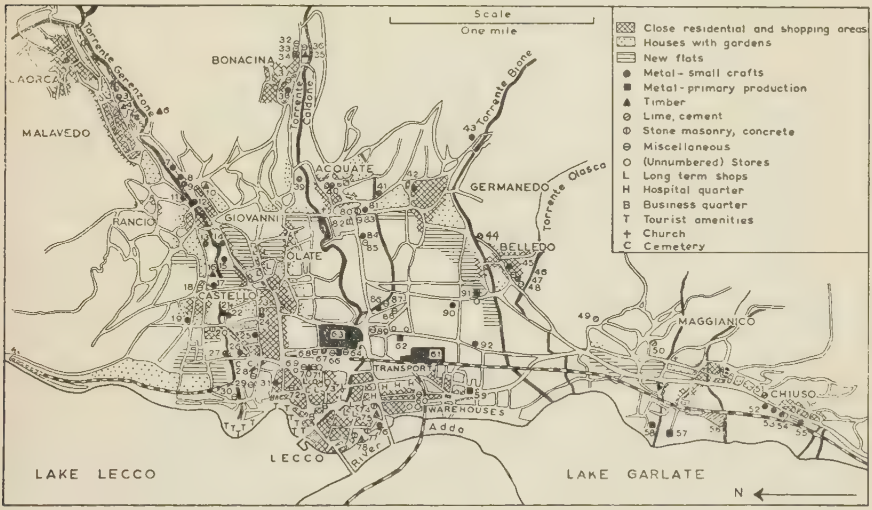

Fig. 2.—Urban development of Lecco. The numerals are factory identification numbers used by the surveyors. Factories Nos. 61 and 63 are large primary metal production plants.

Interstitial growth

More recent additions to the old nuclei take several different forms:

(*a*) *A simple integument* surrounds some of the nuclei, taking the form of more open housing with gardens. This is never a complete ring as virtually all the settlements are confined by relief on at least one side, and often on two, by the mountains above and the rejuvenated stream incision below. In these cases houses with gardens have merely elongated the village, linking it completely to the next in the case of Laorca and Malavedo, or Acquate and Germanedo. In some places the steep slope to the stream has been invaded by a series of factories to capitalize the water power, and although the smaller family businesses include dwellings above the workshop, the others are frequently the *raison d'être* for residential growth on the other sides of the nucleus.

(*b*) *The development of special quarters* is foreshadowed by the differentiation into industrial and residential fringes mentioned above. It also occurs more clearly on a larger scale. On the north side of Lecco, along the lakeside road is a wealthy residential quarter, while new flats nearby are not so well sited for the lake view. It is interesting that specialized doctors, as for rheumatism or tropical diseases, are concentrated towards this end of the town, whereas hospital facilities are more central.

A completely different type of quarter, based on heavy industry, is developing at the opposite end of the town, near Chiuso and Maggianico, partly built on freshly made ground reclaimed from Lake Garlate and depending on road and rail services to Milan. New flats are springing up on the Lecco side of Maggianico.

The more heavily populated north side of the marl embayment naturally has its quota of new flats also, in several small areas. The most spectacular building development, however, is going on in a hitherto agricultural area between Acquate, Germanedo, Belledo and Lecco. These flats are large and conspicuous and are planned to be associated with over a dozen new industries, some of which are already in existence. Industry here is obviously related to road transport, and does not need to be segregated from the housing as along the streams. The characteristics of this quarter therefore are its modernity, open texture and admixture of housing and factories. At present only the edges of the area, adjacent to the existing villages with their services, are built upon, but the whole of this space will be infilled relatively soon, making Lecco as a whole a single compact town unit.

(*c*) The changes mentioned above are both examples of simple additional growth but there is also some degree of *refocusing of function* due to the fact that growth is not merely quantitative but also qualitative. This can be most simply illustrated in the case of Castello, which seems to have had no less than three successive active centres. The old village square with the church is situated on the old valley road where factory 21 is shown (Fig. 2). This must once have been the centre of Castello's life, but to-day it does not contain a single shop. The parallel road on the south, the Corso Matteoti, has exercised an attractive pull, no doubt for two reasons. Not only is the road itself broader and more negotiable by modern traffic, but it also leads directly to the centre of Lecco. Here, then, is a profusion of shops, all for day-to-day shopping to serve Castello itself, and leaving the larger items to be bought in Lecco. But to-day there is yet another change of emphasis. The new flats at Giovanni and Olate have called into being more shops further along the same road, and because of the growing local market these are largely to meet long-term needs, with a wider selection of goods, e.g. a furniture shop, a jeweller and a tailor. This seems likely in time to supersede the little traders down the road as the popular shopping centre. It is the only group outside Lecco itself for "long term" shopping and is a significant index of the expanding market potential of this growing town.

The main refocusing of function has naturally gone on in Lecco itself. There even longer term goods, such as washing machines and television sets, are offered for sale, serving a much larger complementary market region than any of the village nuclei. Long-term shops occur along considerable stretches of at least six streets, and have called into being a second order of service functions, namely stores and warehouses to serve the shops, such as a refrigerating centre, soap stores, a tyre depot, and a store for grocery equipment.

In other ways, too, Lecco has assumed a servicing role, and by serving the other centres has become their master. Rail services had to be centred in Lecco by the sheer nature of the ground surface, and to these have been added town bus services radiating in each of the four directions mentioned above. The function of maintaining communications across the lake has been enhanced by the opening of a new bridge across the Adda in 1955.

The predominance of Lecco has been enhanced by the subequality of the other centres which has tended to prevent any of them from rising to superiority. None is large enough to contain all the rural services: one has what the other lacks. Thus, a bank is found in Malavedo and Germanedo; a post office in Malavedo, Giovanni, Castello, Acquate and Germanedo; doctors reside in Laorca, Germanedo and Bonacina; and there is a children's hospital in Castello. Lecco, by contrast, has a definite post office and banking quarter, a hospital quarter, a separate small "Harley Street", as well as transport, tourist and shopping areas. It also performs similar service functions for the area's industry, and since industry is the basic reason for the town's expansion, this must be examined in more detail.

Industrial distribution

Each of the three main industries of Lecco (metal, timber, and limestone products respectively) falls into two categories, i.e. outside and inside Lecco itself. Though not an invariable law this distinction is nevertheless significant.

Nearly all the 54 metal works are of the small craft type. Only ten are engaged in primary production of metal, and many are not producing finished goods either. There is a surprising amount of "taking in of each other's industrial washing", and circulation of semi-finished products. For example, one firm takes in iron bars and reduces them to thick wire. Another puts this wire through as many as 27 different processes, thinning it to a diameter as fine as 0·8 mm., after which it is moved to a third factory to be made into insulated flex. Thicker grades may go as wire coat-hangers from one works to be coated with plastic in another. There are ten wire-drawing works supplying a large number of firms which make wire netting for chicken runs and tennis courts, wire baskets, bedsprings, nails, screws and chains, while locks and hinges are also popular products. This type of industrial organization clearly absorbs a greater labour force than need be used, and reflects Italy's basic problem, namely over-population.

The great majority of these works are sited for water power in the outlying nuclei especially along the Torrente Gerenzone. Some still use waterwheels but in places these wheels are seen in various stages of decay as electricity first supplements and then supplants direct water power. One factory owner described how one man working a new electric machine could produce half as much as 14 men working all the machines of the older part of the plant. Electricity is rapidly gaining ground, as cheap supplies are available either in small quantities from the local streams or else for larger demands from the public system generated at Sondrio. The latter source could explain the appearance of four small metal works in Lecco itself, where no water power is available.

Lecco, however, plays a different role in the metal industry. It has taken the lead in supplying the primary metal required for further processing. It has five foundries or steel works, four situated on the railway. Two are very large undertakings. Obviously there was no room left in the town by the time such works came to be built, and their siting on the far side of the railway is reminiscent of English practice. Two other blast furnaces are downstream near Maggianico. Ores are imported.

The timber industry has several forms which can be classified into those dependent on power, such as sawmills and paper works sited on streams, and those independent of power, such as boat-building and furniture-making which are mainly in Lecco where they would have a marketing advantage. Perhaps it would be truer to describe the latter class as traditionally independent of power since electrical tools and machines are now employed at some works.

The limestone trades show similar division in distribution. The external industries are located, not by power as with the metal and timber works, but by raw material, and instead of a concentration in the north, they are aligned along the south side of the embayment, where the limestone appears to be less dolomitic. Quarries support adjacent lime and cement works, while down on the main road near Maggianico is one of the largest carbide plants in Italy. This, like the two blast furnaces nearby, illustrates the tendency of heavy modern industry to appear on the lake flats downstream of Lecco. This area also provided a case of the use of natural gas brought in by pipe line.

In and around Lecco itself the stone industry is traditionally one which has not required mechanical power, thus repeating the timber motif noted above. There are several stonemasons who now deal with a variety of materials beside the local stone, and who also use electricity to drive polishing tools. One, at least, has branched out into stone mosaics and decorated panels for the exteriors of buildings, as well as sinks and coffee tables. The awareness of diversified market potentialities is undoubtedly associated with the main settlement. Concrete is another aspect of this industry, and in addition to a works in Lecco, there is one on the fringe of Acquate nearest the new building estate.

The other industries of Lecco show a fair degree of variety often coupled with either present or former independence of power, for example: signwriting, tailoring, printing, and the assembling of telephones and electrical parts.

Just as Lecco operates service functions for the population itself and for retail trade, so too it provides secondary services for industry. For example there is a transport firm operating a fleet of lorries to carry wire and similar products to other parts of the country. There are a few offices and headquarters buildings divorced from the factories. But the most important contribution is made by warehousing. The retail trade warehouses are dotted about the shopping centre, but most of the industrial warehouses are on the south side, especially along the lake front. They are often large, but have not been surveyed in detail. Their existence in this quarter perhaps explains why the downstream heavy industry of Maggianico does not in fact encroach more closely on the town than it does.

So far the industrial distribution has shown a well-marked adherence to definite quarters, but in the large new industrial estate between Acquate, Belledo and Lecco, such distributions which are associated with natural geographical growth break down somewhat under artificial planning. This process is rendered the easier by the availability of electric power. Several of these new industries spring from the town's traditional small metal crafts, e.g. locks, door handles, and key rings, but nearer to Lecco is a clothing factory and a one-man concern making tubular steel furniture with sprayed wood surfaces. A Shell oil depot established in relative rural isolation in 1934 is now being fast overtaken by residential spread. Industry in this zone may be still mobile. One local works moved down towards Milan in 1956, and it remains to be seen whether further sorting under economic pressure will impose some characteristic trend upon this new industrial quarter as on the rest of the area.

The future

Possibly another decade or two will witness the complete urban infilling of the marl embayment with a downlake trail of industry well beyond Chiuso. There is also an orientation towards Lecco of the west bank nuclei of Malgrate and Valmadrera, which already have a similar industrial economy with nail factories and limeworks, etc. The 1955 bridge should foster the integration into Lecco of these two villages. Lecco in 1970 may well have a much more ordinary layout, the present separate nuclei being completely engulfed into one continuous urban unit.

This prospect of unmitigated industrial town growth may perhaps appal the English reader, but Lecco is no eyesore offending the surrounding Alpine beauty: scarcely a factory chimney exists. The Lecco man, however, much as his town may spread, will never lose the sight of the dolomite crags above him, nor the clean, open lake space, and it seems better that an industrial town should develop where it will never be more than a dwarf among mountains than in some less well-endowed spot where the inhabitants might be entirely confined by their own urban skyline.

Millionaire Cities To-day and Yesterday

DAVID L. LINTON

AN ESSENTIAL AND STRIKING FEATURE of the human geography of the modern world is the emergence of urban agglomerations of very large size and in rapidly increasing numbers. Thirty years ago cities of more than a million population numbered only about a score in the whole world. They were still few enough to be regarded as something rather exceptional, and nobody at that time seems to have shown any awareness that this situation was likely to change in a radical way. By the later thirties it had become clear to some discerning minds that the very large city, for which the million population provides a convenient if arbitrary size definition, is a distinctive phenomenon in human geography requiring special observation and study. Fawcett coined the term "millionaire cities" for them in 1935.[1] Preston James, well aware of their significance, listed fifty-one such cities "about 1940" in *A Geography of Man*.[2] Dr. Audrey Lambert in a re-appraisal of the situation twenty years after Fawcett's paper lists 69 cities as actually having more than a million inhabitants in 1955, and 14 more as giving every expectation of reaching this figure by 1960.[3] Yet Professor Pierre George in his important book, *La Ville*, published in 1952 accords no special treatment to such cities in his pages.[4]

To-day, the fact is that they are about four times as numerous as they were in the 1920's and together they probably hold one thirteenth of all the people in the world. There is no room for question about their importance to geographers. But reliable information from which the actual populations of these large urban agglomerations could be deduced is hard to come by. For any one of them study in the field and with good topographical maps and air photographs is required to decide what is part of the agglomeration at a given time and what lies outside it. When this question has been answered there remains the problem of extracting from the details of the census enumeration the number of people who live in the urban agglomeration thus carefully defined. Statisticians' approximations have been provided in some cases by census authorities themselves, e.g., for the six "major conurbations" of Great Britain,[5] or for the "standard metropolitan areas" of the United States,[6] but such approximations do not wholly satisfy the urban geographer. Research is needed if any precision is to be achieved in this matter, and the magnitude of the task clearly calls for research organized on a co-operative basis. It would seem that

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such a study of world-wide scope might be appropriately made by one of the special commissions of the International Geographical Union following its XIXth Congress in Scandinavia in 1960.

In the meantime we cannot even be sure just how many of the world's large urban agglomerations qualify as millionaire cities. Yet teachers of geography in colleges and schools will not be wrong if they feel that, in a matter of this importance, approximate figures are better than no figures at all. They may therefore consider the figures set out in Table I as useful. This table is a transcript of Table 427, "Population of towns numbering over a million inhabitants" which appears on page 412 of the 1956 official Polish statistical handbook.[7] A footnote explains that the figures are totals for what we should call

Table I

MILLIONAIRE CITIES OF THE WORLD

Populations in thousands at dates stated.
(Quoted from *Rocznik Statystyczny*, Warsaw, 1956.)

EUROPE

London	(1951)	9201
Paris	(1954)	5155
Moscow	(1956)	4839
Berlin	(1953)	3481
Leningrad	(1956)	3176
Manchester	(1951)	2421
Birmingham	(1951)	2237
Budapest	(1954)	1781
Vienna	(1951)	1766
Glasgow	(1951)	1758
Hamburg	(1955)	1757
Rome	(1952)	1739
Madrid	(1950)	1618
Barcelona	(1950)	1545
Liverpool	(1951)	1382
Milan	(1952)	1290
Athens	(1951)	1244
Bucarest	(1956)	1237
Copenhagen	(1952)	1179
Naples	(1951)	1144
Stockholm	(1954)	1029
Warsaw	(1955)	1001
Istambul	(1950)	1000

NORTH AMERICA

New York	(1952)	13580
Chicago	(1950)	4921
Los Angeles	(1950)	4368
Philadelphia	(1950)	3671
Mexico	(1950)	3049
Detroit	(1950)	3016
Boston	(1950)	2370
San Francisco	(1950)	2241
Pittsburgh	(1950)	2213
St. Louis	(1950)	1681
Cleveland	(1950)	1466
Washington	(1950)	1464
Montreal	(1951)	1395
Baltimore	(1950)	1337
Havana	(1953)	1190
Toronto	(1951)	1117
Buffalo	(1950)	1089

ASIA

Tokyo	(1954)	7500
Shanghai	(1953)	6204
Calcutta	(1951)	5008
Bombay	(1951)	4000
Osaka	(1950)	3786
Jakarta	(1952)	3000
Mukden	(1953)	2987
Peiping	(1953)	2768
Tientsin	(1953)	2694
Chungking	(1953)	1772
Saigon	(1951)	1604
Canton	(1953)	1599
Seoul	(1949)	1446
Wuhan	(1953)	1427
Madras	(1951)	1416
Delhi	(1951)	1373
Hong Kong	(1950)	1314
Manila	(1948)	1312
Bangkok	(1952)	1179
Harbin	(1953)	1163
Karachi	(1951)	1126
Kyoto	(1950)	1102
Nanking	(1953)	1092
Hyderabad	(1951)	1086
Nagoya	(1950)	1031
Teheran	(1950)	1010

AFRICA

Cairo	(1952)	2512
Alexandria	(1952)	1069

SOUTH AMERICA

Buenos Aires	(1947)	4645
Rio de Janeiro	(1950)	2552
São Paulo	(1950)	2228
Santiago	(1952)	1348

AUSTRALIA

Sydney	(1954)	1862
Melbourne	(1954)	1523

urban agglomerations or conurbations. The figures quoted (in thousands) for Liverpool (1382), Manchester (2421) and Birmingham (2237) are those given in a special report of the census of 1951 as the populations of the Merseyside, S.E. Lancashire, and West Midland conurbations. The population of the West Yorkshire conurbation (1692), however, is omitted, as is also that of the Ruhr conurbation (about four millions), presumably because neither has a single dominant centre. Further, the figure 9201 quoted for London exceeds the 8346 of the 1951 census enumeration by a substantial amount which is not easily understood. A similar excess of the figure 13,580 quoted for New York in 1952 over the 12,912 recorded for the New York–North-eastern New Jersey Standard Metropolitan Area by the 1950 census is probably an allowance for two years' growth at 2·6 per cent per annum. These variations from readily accessible figures give a salutary warning that these data which are avowedly not contemporaneous are also not uniform. Some of the figures represent the summation of census figures for the several administrative areas in a conurbation: some may be census figures adjusted for population growth to the year named: some are probably municipal estimates, and some no more than the best available guess. The round figures of four millions for Bombay and one million for Istambul are probably sound enough estimates but the three millions figure for Jakarta may be in error by several hundred thousands. Moreover it is probable that the list is not complete. The United Nations Report on the World Social Situation published in 1957[8] gives some figures for cities in Africa and Latin America which are quoted in Table II: they modify some in Table I and add four cities to the total. Further, the Chinese Census of 1953 is stated by Cressey to ascribe a population of 1,054,000 to the twin city of Luta (Port Arthur-Dairen), and it is possible that Lima, Singapore, and Pusan (Korea) should be added to the list of actual millionaire cities.

Table II

SOUTH AMERICA		
Buenos Aires	(1955)	5617
Rio de Janeiro	(1955)	3625
São Paulo	(1955)	3325
Montevideo	(1955)	1150
Bogotá	(1954)	1000
Caracas	(1955)	1000
AFRICA		
Johannesburg	(1956)	1007

Without the detailed and painstaking research of which we have spoken we can be sure neither of the tally of millionaire cities nor of their individual populations. But if we take the figures of Tables I and II as being even a rough guide to the current situation some striking conclusions emerge when we compare them with approximations for earlier decades. These conclusions are probably best revealed by Fig. 1 which puts the information in semi-graphic form, but it may be helpful if they are here summarized in words.

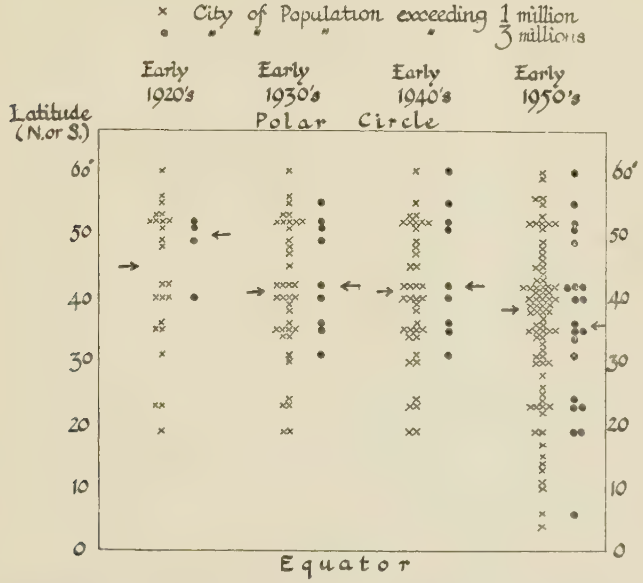
In the early 1920's there appear to have been 24 millionaire cities in the world with an aggregate population of 51·4 millions, or an average of 2·14 millions per city in the group. Each of these 24 cities is marked by a cross on the diagram, the cross being given its correct position in latitude relative to the scale at the left-hand side. (It should be noted that no distinction is here made between the northern and southern hemispheres and the crosses representing Buenos Aires and Osaka appear side by side.) The mean latitude of the 24 cities is 44° 30′, and the modal latitude of the plotted crosses is shown by an arrow at 45°. Four of the 24 cities had populations in excess of 3 millions at this time and these are separately indicated by circles: the arrow representing the modal latitude of those four circles is placed at 50°.

Similar data are plotted for 39 cities in the early 1930's, 41 cities in the early 1940's and 80 cities in the early and mid 1950's, the cities over 3 millions numbering 4, 9, 9, and 21 at the same periods. The retardation of large city growth by the war was more than made up in the post-war years. The aggregate populations of the millionaire cities grew from 51·4 millions to 85·2, 91·8 and 192·5 millions at the successive decadal periods. If we take round figures of 1800, 2000, 2200, and 2500 millions to represent the total population of the world at the same intervals, these city totals represent 2·86, 4·26, 4·66 and 7·66 per cent of those totals. In other words, despite the quite fantastic rate at which world total population is growing, the number of its peoples who live in millionaire cities is growing even more rapidly so that they form a rapidly increasing percentage of the whole.

The average size of the cities of millionaire status in the early 1920's was 2·14 millions. This figure has also increased, and in succeeding decades became 2·18, 2·25 and 2·40 millions. Since mere addition of new cities to the group at its lower population limit would by itself simply depress the average, it is clear that this factor is more than offset by the very powerful growth of the larger cities in the group. The first ten cities to-day—New York, Tokyo, London, Shanghai, Buenos Aires, Paris, Calcutta, Chicago, Moscow and Los Angeles—had in the early 'twenties an aggregate population of 28·2 millions: in three decades that had increased to 66·5 millions. Thus, not only is an increasing proportion of the world's population to be found in millionaire cities, but an increasing proportion of these dwellers in millionaire cities is to be found in the largest cities of the group.

The most striking feature revealed by our diagram, however, is the proliferation of great cities in low latitudes during the last three decades, but particularly since the last war. The mean latitude of all millionaire cities at each period has decreased progressively from 44° 30′ to 41°, 39° 20′ and 36° 20′. The modal values have declined from 45° to 41°, 41° and 38° 30′. For the three-million group the decrease in the modal latitude is even more striking, the values being 50°, 42°, 42° and 36°. Until the later 1940's only four millionaire cities—Bombay, Calcutta, Mexico City and São Paulo—were to be found between the Tropics:

now our diagram shows fifteen.* This rapid growth of large urban communities in low latitudes is an essential feature of the human geography of our day. It is certainly not confined to the group of millionaire cities as may be seen from a table in the United Nations Report on the World Social Situation already cited.[9] That table lists some 29 cities in Africa south of the Sahara whose population at the latest estimate exceeded 100,000 people. Several of these have increased in size many-fold during the last two decades.



No. of Cities	24	39	41	80
Mean Latitude	44°30′	41°	39°20′	36°20′
Total Population	51·4	85·2	91·8	192·5
Mean "	2·14	2·18	2·25	2·4
World Population	1800	2000	2200	2400
% of World "	2·86	4·26	4·66	7·66

D.L.L. Feb. 1958

Fig. 1.—Millionaire cities.

This rapid growth in low latitudes may also be revealed for the millionaire cities in a rather different way. If we compare populations of the early 1950's with those for the same cities twenty years earlier we find that the millionaire city that has grown most rapidly is Saigon (latitude 11°), the later population being 15·8 times the earlier. (That the growth was centred on two nuclei does not materially affect the issue.) Mukden (latitude 42°) increased 7·1 times, Caracas (10°) 7·1 times, Jakarta (6°) 5·6 times, and Karachi (25°) 4·3 times. The mean latitude of this group of cities is 19°: their aggregate population has increased five-fold in the two decades. A second group of ten cities (Athens, Bogotá, Bombay, Calcutta, Delhi, Los Angeles, Manila, Mexico, Rio de Janeiro and Seoul) can be distinguished by increases which are more than three-fold but less than four-fold in the two decades: the mean latitude of this group is 23°. Six cities (Buenos Aires, Harbin, Havana, Hyderabad, Teheran and Washington) show a rate of increase between two- and three-fold: their mean latitude is 32°. Not one of the other great cities of the world appears to have doubled its population in the twenty-year period. Some of the great Chinese cities approach this figure (Canton (latitude 23°), Shanghai (31°), and Tientsin (39°), all 1·9 times). The large cities of north-eastern North America show increases of 50 to 80 per cent, the two large Australian cities about 50 per cent. Finally when we come to the cities of Europe, though there are some exceptions like Copenhagen (increase 43 per cent), small increases are the rule (London 2 per cent, S.E. Lancashire conurbation 0 per cent) and a few cities like Berlin and Vienna show an overall decline.

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* Bangkok, Bogotá, Bombay, Calcutta, Canton, Caracas, Havana, Hong Kong, Hyderabad, Jakarta, Madras, Manila, Mexico, São Paulo and Saigon.

There is in these figures a broad inverse proportionality between latitude and rate of growth that cannot be disregarded. The most rapidly growing cities of the world to-day are by and large in warmer climes. This is not to say that the tropics are becoming extensively urbanized. The proportion of total urban to total rural population in tropic countries remains low. In this sense maps such as those prepared by Mark Jefferson[10] or Pierre George[11] showing the percentage of population which is urban in the different parts of the world correctly show the tropical lands as feebly urbanized. But such maps, by emphasizing the high proportion of the population which is urban in temperate lands, are in the present context quite misleading. They suggest that urbanization in low latitudes is insignificant: in fact it is real, massive and important. The emergence of millionaire cities and even five-million cities in tropical countries is now widespread and continuing, and has social, economic, and political implications that, to say the least, require the most careful study and attention.

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[10] M. Jefferson, "Distribution of the world's city folks", *Geogr. Rev.*, vol. 21, 1931, pp. 446–65, Fig. 1 on p. 447.

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Regional Geography in the Grammar School

G. S. HALL

During my short experience as a teacher, my main problem has been the search for a satisfactory method of teaching regional geography. For much of the time I have used variations of the familiar systematic method in which position, relief, drainage, climate and the rest are treated in turn. But this method has serious limitations. The most important criticism is that, however hard the teacher may try, he cannot entirely eliminate the tendency among his pupils to regard the facts under the various headings as separate and unconnected, whereas our aim is to treat areas as wholes and to make clear the relationships which exist between geographical facts. After all, one of the main claims made for geography in education is that it gives a training in "viewing problems in their all-round relations" and "from all possible directions" and in "seeking correlations of varied and apparently disconnected phenomena".[1]

In devising one's own scheme of teaching, it is necessary to take careful account of aims. This is a subject about which much has been written because geography has had to win for itself a place in the curriculum, and it would be superfluous to write more on it here. But it is interesting to consider whether our aims are fulfilled. In this connexion, an article[2] in *The Times Educational Supplement*, quoting examples of howlers and downright sloppy thinking in O-level examination scripts, makes depressing reading. The article concludes with these words: "Do teachers of geography regard geographical expression in writing as none of their business? How can an O-level candidate do himself justice when muddled thought finds muddled expression? The principle that fieldwork is an essential part of geographical study is now becoming established. Of what use can this or any other kind of geographical study be if the results are to be remembered, and reproduced, in terms such as those quoted here?" In other words, when a pupil cannot express clearly and accurately in his native language what he knows, then he doesn't know it! The status of geography, far from being improved, may very well worsen, and deservedly so, if the subject earns the reputation of being a haven for woolly minds. Is it possible that teachers of geography have been too much concerned with the *peculiar* contribution of geography to

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education and have not considered sufficiently how far the subject can contribute to the educational aims that it should *share* with all subjects? A person educated at a grammar school should be trained to use books in a scholarly manner, i.e., to select relevant information, to discard irrelevant information, and to use judgment in determining the relative importance of facts; to classify information and to arrange it in a logical, significant order, i.e., to write clear, well-arranged notes—an indispensable attribute of the scholar; and to write crisp, concise English, free from vagueness and confusion. If school geography does not do its share in furthering these aims, then it does not deserve a high status in the curriculum. A method of teaching which takes account of these aims should, moreover, give the pupils an excellent preparation for examinations. It is fashionable to belittle the importance of examinations and to complain of the restricting effect of the syllabus. But O-level syllabuses in geography are sufficiently wide to be free from the criticism of cramping. And examinations *are* important. They are a test of character as well as of knowledge; they require disciplined work over an extended period; and the successful answering of questions requires some exercise of judgment, of arrangement, of selection and of timing.

My own method of teaching regional geography (which I hope may prove of interest to others) deals with countries and not with natural regions. The natural region is a vague concept which envisages the combination of all natural and human phenomena into some mystical unity, and the idea is as likely to be wrong as right.[3] Trained adult geographers may understand what the idea means; most schoolchildren certainly cannot. But a political unit is a different matter—it is concrete and children can understand it. It is an area in which a people organizes its economic, social and political life, perhaps quite differently from an adjacent country with a similar natural endowment. Though the idea of fully integrated natural regions is rejected, the idea of regions based on a single criterion cannot be rejected. The most important criterion is climate, because there is some correlation between climate and natural vegetation, soils and agricultural type. As climate is such an important and fundamental factor, the continent is divided into climatic regions before the study of individual countries begins. To avoid confusing the pupils, the same system of climatic classification is used throughout the school, and the best one for the purpose is that devised by A. Austin Miller.[4] By the time the pupils reach the fifth form, having used this classification in the study of all the continents, they should have a good knowledge of it. The climatic regions must, of course, be explained and accounted for, but the depth of explanation will depend on the age and aptitude of the pupils, working up to a final statement and revision in the fifth year. This study of climatic regions is the only treatment of the continent as a whole that need be done before the study of individual countries:

features of relief and drainage are dealt with at that next stage, and there is nothing to prevent a final systematic revision of the continent as a whole, after the study of the individual countries, if it is felt to be necessary.

Having studied the climatic regions of a continent, the class is ready to begin work on one of the constituent countries, and the following procedure is adopted:

I. *A preliminary general study* of the country as a whole, based upon the following facts:

- (i) the density of population
- (ii) the distribution of the population and the location of the largest towns
- (iii) the occupational structure of the population
- (iv) the land use
- (v) the main imports and exports

compared with a familiar country, e.g., the United Kingdom

II. *Farming.* The distribution of farming types, accounted for in terms of the following factors (where applicable):

- (i) climate, e.g., length of growing season, amount and seasonal distribution of rainfall, etc.
- (ii) relief
- (iii) soil
- (iv) market
- (v) transport: method and routes, with reasons
- (vi) other factors, e.g., natural vegetation, government policy, historical factors, labour, qualities of the people, etc.

III. *Industry.* The distribution of manufacturing, extractive and service industries, accounted for in terms of the following factors (where applicable):

- (i) source of raw materials
- (ii) source of power
- (iii) market
- (iv) transport: method and routes, with reasons
- (v) other factors, e.g., relief, climate, natural vegetation, government policy, historical factors, capital, qualities of the people, etc.

IV. *Towns.* A study of the largest towns, under the headings (i) position and (ii) functions, emphasizing the importance of accessibility and the interdependence of the town and its surrounding region.

V. *Regions.* A suggested division of the country into human-use regions.

Section I makes clear the theme of the treatment, which is the explanation of the density and distribution of population, the key to which is the economy of the country, as revealed by the occupational structure of the population, the land use and the main items of foreign trade, which indicate the surpluses and deficiencies of the country.

This system of teaching regional geography, which is in current use, has the following advantages:

1. It places man at the focus of studies, and yet, far from taking the "Ge" out of Geography, ensures that it is treated in its proper place.

2. It is a definite routine, with which the pupils quickly become familiar; young pupils like a routine and it greatly assists the learning process, whereas variety of approach is slow and confusing.

3. All facts are introduced with a particular purpose in view and they make up a comprehensive, logical whole; facts are not left unrelated, which is a danger in the older systematic method.

4. As this system does not correspond to that followed by any particular text-book, the pupils cannot merely summarize the text-book treatment, but rather, they receive a valuable training in the selection of facts, by having to abstract relevant information and discard irrelevant material.

5. The pupils learn the *relative* importance of facts: in the older systematic method in which the physical geography is studied first, the pupil has no guide to the relative importance of the effects of climate, relief, natural vegetation, etc., upon the human geography, but where, as in the present system, he uses the physical geography as part of the explanation of the human, the relative importance of the various factors becomes immediately clear. Of what importance, for example, is a knowledge of the natural vegetation in the regional geography of large parts of the British Isles?

6. As the pupil knows what information he requires, he soon learns the deficiencies of his text-book, and becomes quite naturally a discriminating user of other books and sources of information.

7. The system, with its emphasis on the classification of information, gives a training in good note-making, with a uniform scheme of headings and sub-headings, and it helps in the acquisition of an adequate geographical vocabulary.

8. The pupils do not need prompting to ask relevant questions, because they know what information they are looking for and soon find out whether or not their books provide it.

9. The system enables the pupils largely to teach themselves, giving the teacher more time for giving guidance instead of information and for giving more individual attention to pupils.

10. It ensures that problems are viewed "from all possible directions".

11. It puts a higher premium on the discipline of hard, concentrated, logical study, which is what a grammar school should require: it disappoints pupils who regard geography as a "soft option".

12. The definiteness, uniformity and logical development of the system give the pupils a confidence and an understanding of the *purpose* of their studies, without which it is unreasonable to expect them to write clear, direct, unambiguous English.

In view of the claim that this system is comprehensive, it must be added that simple geomorphological studies are not neglected; on the contrary, they are introduced in the most logical place. For example, in a study of Scotland, the best point at which to deal with the formation of rift valleys is when it has been found that 80 per cent of Scotland's population lives in the Central Lowlands, because all coal, the best soils, the easiest communications and so on are there. Children will have little interest in rift valleys as such, but will have more interest when they see how these valleys are related to other things. But, though physical geography is given proper emphasis, the system cannot be deterministic, because such factors as the qualities of the people and the policy of the government are always considered.

One or two observations on the system in practice may be of interest. I have found, for instance, that a second-stream second form is quite capable of learning, remembering and using the Austin Miller classification of climates for the southern continents; that a fourth-stream fourth form can make an intelligent study of Europe in as much detail as there is in the text-book *Europe* by Pickles, which goes beyond what is generally considered sufficient at that stage; and that all forms have shown themselves capable of answering intelligently questions of a fairly searching character. For example, second forms have done well with "State the differences which exist between the north and the south of West Africa in (i) climate (ii) natural vegetation and (iii) products" and with "Describe and account for the distribution of population in the Union of South Africa"; third forms have coped satisfactorily with "Give an explanatory account of cotton cultivation in India and Pakistan" and with "Explain fully why Japan is one of the world's leading fishing countries"; fourth forms have written good answers to "Explain how the farming of the Swiss Alps is influenced by the relief and climate", to "Describe the distribution of population in Iberia and state how far it agrees with the distribution of rainfall" and to "Explain why Catalonia is the premier manufacturing region of Spain".

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This Changing World

EDITED BY G. J. BUTLAND

THE SUMMER OF 1958 IN THE BRITISH ISLES

A climatic problem of perennial interest is the British summer. To what extent can the summer of 1958 be regarded as an unusual one? The following table, based on the twenty stations reported in the Monthly Summaries of the Daily Weather Report, gives a convenient summary of the facts. All figures represent variations from the average.

	Maximum temperature	*Minimum temperature*	*Sunshine*	*Rainfall*
June	−2° F.	Average or just below	70%	190%
July	−1° F.	Average or just above	Average	135%
August	−1° F.	−1° F.	80%	105%
September	+2° F.	+3° F.	Average	137%

Clearly temperatures and sunshine have been well below average on the whole, and rainfall above normal. But definite regional variations have occurred. June was fairly dry in Scotland, with above average sunshine in the Hebrides. July sunshine was slightly above average in the north but below average in the south, and the Hebrides were dry. Although rain was very heavy in August in southwest and southeast England, it was near or below average over much of Scotland and Northern Ireland. In September, again, Scottish rainfall was below average whilst elsewhere it was very wet, and although temperatures were well above normal in the southern half of Britain, they were appreciably below average in the north.

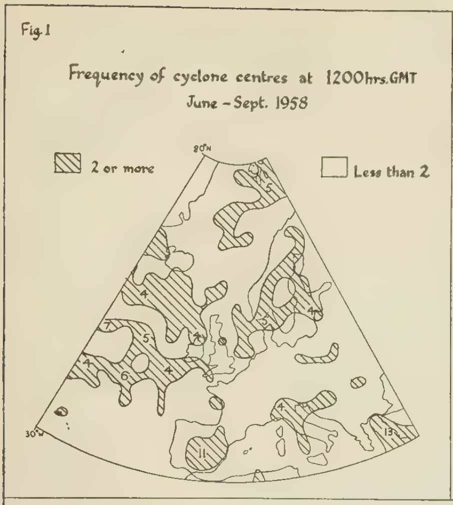
Certain long-period records were broken. Kew had its wettest June for 55 years; Plymouth had its lowest August sunshine total since 1922; and Ross-on-Wye its wettest September for 82 years. On the other hand, Lerwick reported 74° F. in June, its highest temperature within the present century; Leuchars had its lowest June rainfall ever recorded; and Dyce reported its highest July temperature of 83° F. And, looking at graphs for two sample stations (Fig. 2), both 1954 and 1956 had less total sunshine. The summer of 1950 at Renfrew was far wetter than that of 1958, while at Kew, although the 1958 summer was the wettest of the last ten years, it was only slightly wetter than that of 1956.

Manley, in *The New Scientist*, 16th October 1958, p. 1054, gives some facts concerning bad summers of earlier years: 1879 had the worst summer of the instrumental record, and 1958 is not even amongst the worst twenty, according to his method of ranking. The 1879 figures for England and Wales are given as follows:

	June	*July*	*August*	*September*
Mean temperature departure from normal	−2·5°	−4·2°	−2·0°	−1·3°
Percentage of average rainfall	213%	156%	178%	144%

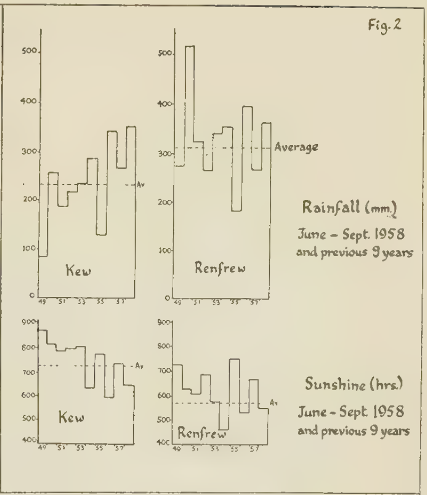
The amount of cyclonic activity affecting the British Isles during the summer months does not appear to have been excessive (Fig. 1). The percentage frequency of cyclone centres over these islands at 1200 hrs. G.M.T.

Fig. 1



Frequency of cyclone centres at 1200hrs. GMT June – Sept. 1958

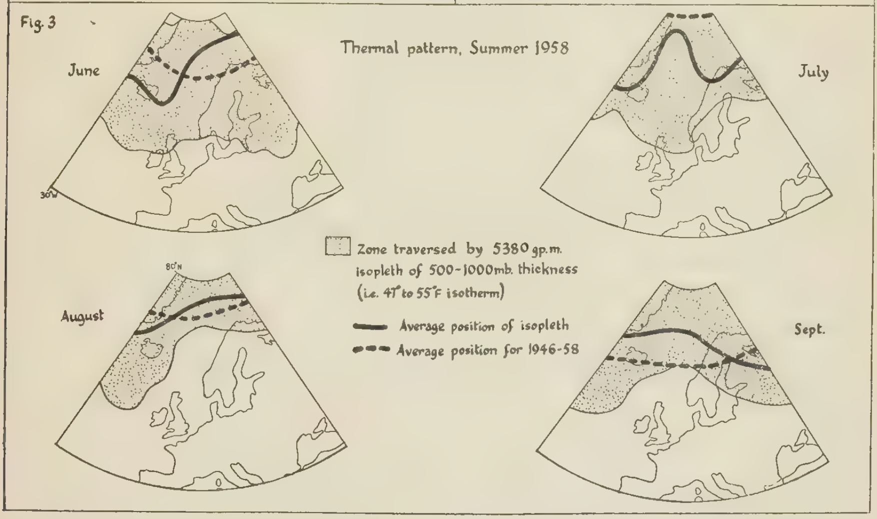
Fig. 2



Rainfall (mm.) June – Sept. 1958 and previous 9 years

Sunshine (hrs.) June – Sept. 1958 and previous 9 years

Fig. 3



Thermal pattern, Summer 1958

June
July
August
Sept.
30°W
80°N
☐ Zone traversed by 5380 gp.m. isopleth of 500–1000mb. thickness (i.e. 41° to 55°F isotherm)
Average position of isopleth
Average position for 1946-58

(estimated from the charts in the Daily Weather Report) varied from 1·5 per cent in Scotland and most of England and Wales to 2 to 3 per cent in north-east England, Devon, and the extreme northern and southern parts of Ireland. This compares with the long-period (1899–1939) average* of 1 per cent for the south coasts of Britain and Ireland and 2 per cent for the north coast of Scotland. Really great cyclone frequency did however occur over Spain (9 per cent; average 0·5 to 1 per cent) and the west coast of Turkey (11 per cent; average 0·1 to 0·2 per cent).

The cause of the generally cool, cloudy and rainy summer seems to have been a pronounced oscillation and general southward displacement of that zone of the Westerlies which usually covers the British Isles. Even this phenomenon has not been at all out of the ordinary for the last decade. In considering large-scale movements such as these, when weather over a wide area is determined by the movements of enormous masses of air of great vertical as well as horizontal extent, it is essential to study the motion of the atmosphere as a whole. Hence use must be made of aerological data as well as the usual surface observations. The latter often indicate surface air movements of a purely local character, bearing little relation to the powerful air currents which are the prime causes of weather and climate on a countrywide scale.

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* S. Petterssen, "Some aspects of the general circulation of the atmosphere", *Cent. Proc. Roy. Met. Soc.*, 1950, p. 145, Fig. 17.

The movements of the lower half of the atmosphere over the area to the north of the British Isles are illustrated in Fig. 3, by tracing the oscillations of a particular 500–1000 mb. thickness isopleth. This is, in effect, a way of labelling a portion of the troposphere so that one may trace its movements. A thickness isopleth is also equivalent to an isotherm for the lower half of the atmosphere. In this case, the isopleth of 5380 geopotential metres corresponds to a sea-level temperature of 47° F. for saturated air, and 55° F. for air which is relatively dry. The zone over which this isotherm moved throughout each month (based on the 0000 hr. G.M.T. chart in the Daily Aerological Record) is shown stippled. With the exception of one day in July, when conditions were marginal, the southernmost limit of this zone is well to the north of the extreme southern limit for the period 1946–58. Comparison of the position of the southern edge of the stippled zone with the course of mean monthly sea-level isotherms in an atlas shows that, with the exception of September, the atmosphere over the British Isles was significantly cooler than normal. The average monthly positions of the thickness isopleth, in comparison with the normal values (i.e. the mean of the period 1946–58) clearly reveal the southward displacement of the Westerly belt. They also emphasize the longitudinal oscillations to which it was subjected: a marked troughing in June is especially pronounced.

It is to such relatively minor movements of the troposphere as a whole, rather than to nuclear explosions, that the unpleasant British summer of 1958 should be attributed.

University of Birmingham. E. T. STRINGER.

CEUTA AND MELILLA: SPAIN'S PLAZAS DE SOBERANÍA

The attainment of independence by the Kingdom of Morocco has brought to the fore territorial complications that were masked during the period of the Protectorate. The problems of the Spanish territories in the south of the country have had their share of the news since 1956; but this should not allow us to overlook the problems of the much more important remaining Spanish territories in the north.

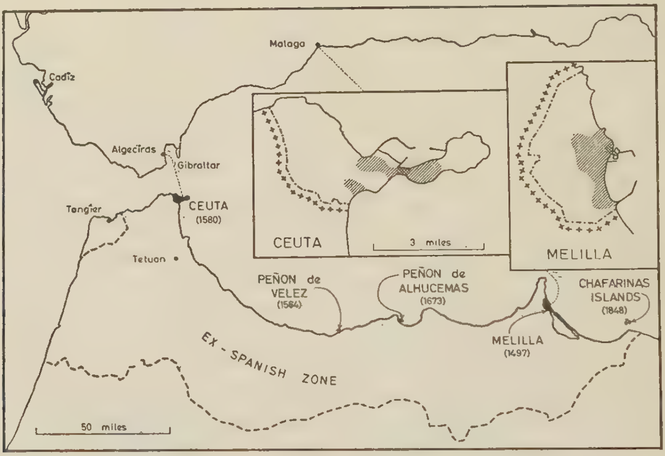
Before the definition of the Spanish zone of predominance in northern Morocco in 1904, Spain already possessed five territories on the Mediterranean coast: Ceuta, Melilla, the Chafarinas Islands, the Peñón de Alhucemas and the Peñón de Velez de la Gomera. They were at that time known as the *presidios*; the official title to-day is *plazas de soberanía.* The earliest, Melilla, was taken from the Moors immediately after the reconquest of Granada; the latest, the Chafarinas Islands, not until 1848. Ceuta was captured by the Portuguese in 1415, became a joint possession on the union of the crowns in 1580 and remained with Spain after the separation in 1640. The three island possessions are all small and insignificant, their combined population in 1950 being only 184. Ceuta and Melilla are of a different order of importance.

Ceuta, a city of 60,000 people, almost exclusively Spanish, lies on a narrow isthmus between the small peninsula of Almira and the mainland, and the total area of the enclave is about seven square miles. The Bay of Ceuta forms the best natural harbour on the whole coast of Morocco, and its position on the Straits of Gibraltar makes it doubly valuable. The population of Melilla is larger (over 80,000), but the proportion of Moors is greater. The natural harbour is perhaps the best between the Straits and Oran; but it is nothing like as good as Ceuta's, and lies of course well to one side of the main shipping lanes. The Spanish territory covers about five square miles, extending rather over a mile in all directions from the old town. There is even room for a small aerodrome, for which the ground at Ceuta is too hilly.

Both towns were already administered separately from the Spanish Protectorate in Morocco, Ceuta as part of the province of Cadiz, Melilla as part of Malaga. Their status has not changed since the surrender of the Protectorate; but in practice the administration of all the *plazas de soberanía* has tended recently to be centred at Ceuta, which now has almost all the administrative offices of a provincial capital. Equally a frontier existed between the *plazas de soberanía* and the Protectorate. Though the situation remains *de jure* as before, in fact the frontier is now more difficult to cross, not so much for persons (Moroccans require only identity cards) as for goods, which have to contend with a change of currency and with the need for export and import permits, the granting of which now depends on the pleasure of Moroccan officials at Rabat instead of that of Spanish officials at Tetuan. The frontiers of Melilla and Ceuta retain from protectorate days the distinction of having breadth as well as length. Spanish territory is insulated from Moroccan by neutral strips averaging 500 yards in depth. The Moroccans naturally deny the validity of this arrangement; the Spaniards firmly defend it.

What are the prospects for Ceuta and Melilla? How can they expect to fare in their new rôles as Spanish Gibraltars in Africa? Ceuta has least to worry about. The principal support of the town is the port, and the port looks mainly towards the Straits. In recent years Ceuta has gained remarkably in popularity as a bunkering port (in 1957, 2700 vessels entered and cleared, and most had come for oil). Seven different types of oil are available, and ships can lie alongside when oiling instead of anchoring offshore as they have to at Gibraltar. The only industry of importance is the canning of fish which looks seaward for both raw materials and markets. It is not impossible that Ceuta's orientation toward the sea may at some time be officially encouraged by making the place a Free Port on the lines of Gibraltar. This would help it to make full use of its position on the Straits without the danger of smuggling into Spain which would arise from the establishment of a Free Port in the Peninsula itself. Ceuta has even gained new sources of livelihood from the changed conditions in Morocco. The new para-provincial administration has added to the official population paid from Madrid. Also the Headquarters of Spanish Forces in Morocco has been moved from Tetuan to Ceuta. The town is full of soldiers, and is reputed to hold nearly a dozen generals, also paid from Madrid. Basic food supplies have always come mainly from the Peninsula; only fresh vegetables and poultry come from across the frontier. The territory is large and populous enough to house all its own labour force; so that the labour-supply problems that are so acute at Gibraltar have no place here.

On the other hand, the port of Ceuta was also the main outlet and import point for the Western, more populous, part of the Spanish Protectorate and especially for Tetuan, the capital. Economically it is still by far the most suitable port for this traffic. Tangier harbour is poorly protected and equipped, and lighterage is necessary there; Casablanca is 125 miles from the nearest part of the Spanish Zone—but nationalism has been known to speak louder than economic sense. Water supply is a practical difficulty in Ceuta. The springs that serve the city are Spanish property, but they lie several miles beyond the Moroccan frontier.



Cross-hatching indicates the cores of the "old" towns; hatching indicates the present built-up areas.

Melilla is a different kind of place. While the western part of the Spanish Zone was rich in Moorish towns able to serve as central places for the rural areas, in the east Melilla was itself the only town of any importance, and it functioned as the centre as well as the port of the eastern Protectorate, an insecure basis for prosperity now that a truly international frontier separates centre from periphery.

The outlook of the port is different too. Ceuta relies on the position and excellence of its harbour to profit from the traffic of the high seas. Melilla's activity is bound up with its hinterland. It is essentially a shipping port for iron ore from Morocco. Nevertheless the ore mines need Melilla as much as Melilla needs them. Its specialized harbour installations are unique on the coast, though presumably they could be duplicated elsewhere at great cost. The harbour has not the great natural superiority of Ceuta; but there is also no ready-made rival like Tangier, and Moroccan Atlantic ports are even farther away.

Melilla, with its inland orientation, its greater distance from the Peninsula, its lack of administrative functions, and its greater Moorish population, seems to have a more questionable future than Ceuta. So long as relations between Spain and Morocco remain friendly, Melilla can prosper, though hardly as easily as before. But a Morocco determined to cut off its nose to spite its face could probably reduce Melilla to impotence by severing the connection between town and hinterland; similar measures would have no more than a marginal effect on the well-being of Ceuta.

University of Southampton. G. W. S. Robinson.

MECHANIZED CULTIVATION OF PEASANT HOLDINGS IN WEST AFRICA

One of the economic problems facing West Africa is to increase agricultural production of export crops and foodstuffs without disrupting the traditional systems of peasant farming or incurring soil degradation and erosion. A possible means to this end is the mechanization of the cultivation processes. This, however, is a revolutionary change and there are many difficulties to be overcome. These include the small and fragmented peasant holdings, each consisting of a number of small, isolated clearings in bush and savana which are soon exhausted and left fallow; the lack of capital and technical knowledge on the part of the peasants; the possible degradation of many soil types through the use of the plough; and the expense of clearing and "stumping" trees and bush. In addition, there are the high cost of maintenance and supervision of machinery and the fact that, while production models are sometimes unsuited to local conditions, the expense of special equipment is too great. Finally, there is the difficulty of finding annual crops which yield a sufficient income per acre to cover costs, bearing in mind that the main cash crops of West Africa are either tree crops, and thus not yet susceptible to mechanical cultivation, or groundnuts which grow in sandy soils easily degraded by ploughing.

Thus the areas immediately suitable for mechanical cultivation (apart from a few experimental stations or land resettlement schemes) are treeless grasslands with suitable soils which are near urban centres having a large demand for staple foodstuffs. Areas fulfilling these conditions are few but rather more numerous than is generally realized, for there are isolated grasslands, large and small, all along the coastlands from the Gambia to the Niger.

In three such areas mechanized ploughing of peasant holdings has developed over the last five years.

The Accra Plains

This is a triangular area of some 1100 square miles extending eastward from Accra to the lower Volta river. The low rainfall (about 30 inches) results in grassland or very open savana. There is an extensive outcrop of basic gneiss which breaks down into a black clay too intractable for the peasants to cultivate. A mechanical ploughing scheme for this area was inaugurated in 1953 and operated from a nearby agricultural station. Peasant farmers in those villages participating in the scheme concentrate the area which they wish to cultivate into a single block which is ploughed and disc-harrowed. The peasants then plant, tend and harvest cassava and okra (*Hibiscus esculens*), a popular vegetable. These crops do well in the dry conditions and have a ready sale in Accra and Tema. Ruling prices enable the peasants to meet the ploughing fees which are being gradually raised to an economic level. Green fallow crops are encouraged to maintain fertility instead of the area being allowed to revert to bush. Areas ploughed are mainly but not exclusively black clay. The area under the plough has grown from 168 acres in 1953 to 700 acres in 1956.

The riverain grass swamps of Sierra Leone

Rice, the staple food of Sierra Leone, has been cultivated for a long time in cleared mangrove swamps, but these with their permanently waterlogged silt soils are unsuited to mechanized cultivation. There are, however, along the lower courses of some rivers, notably the Little Scarcies and the Sewa, freshwater grass swamps only seasonally flooded. Large acreages of these are now under the plough, and the scheme will be greatly extended if the peasants can adapt themselves to the new conditions.

During the latter part of the dry season, from January to April, the swamps are ploughed and disc-harrowed, and the farmers are encouraged to pay extra for artificial fertilizers to be drilled in with the seed. Bird-scaring and harvesting are the tasks of the farmers. Producer co-operatives have been started to organize transport and marketing and eventually, it is hoped, the cultivation, at present the responsibility of the Department of Agriculture.

The Boli Lands of Sierra Leone

Inland from the swampy coastal belt of Sierra Leone is a wide zone of gently undulating lowland less than 250 feet high. Part of this is underlain by the Palaeozoic sediments of the Rokel River Series. The summits of the undulations are rendered almost useless by a thick lateritic crust, the intermediate slopes are badly degraded through over-farming, while the bottom lands or *bolis* are flooded in the rains and thus useless to the peasant. The Department of Agriculture is encouraging the use of these *bolis* for the cultivation of swamp rice. They are ploughed mechanically and, because the alluvial soil is poor, being derived from the impoverished lands around, fertilizers are drilled in with the seed.

Probably because of the lack of alternative means of livelihood, many of these schemes are received with much enthusiasm from the farmers, who seem more determined to make a success of new schemes than do the farmers of the coastal areas. At Masimu operations have already been taken over, in 1957, by a co-operative. The total area under mechanical cultivation in Sierra Leone reached 6623 acres in 1954. Since then growth has been gradual, a large increase in the *bolis* being partially offset by a decline in the grass swamps of the south. Because there is a sustained demand for rice, more could be done, provided there were machines, skilled mechanics and European supervisors available, and provided the farmers were willing to share in the effort and not simply to expect the work to be done at subsidized rates. Should these schemes succeed—and in spite of set-backs the signs are that many will do so—a most important step forward will have been taken in West African agriculture.

Fourah Bay College, Sierra Leone. H. P. White.

IRRIGATION DEVELOPMENTS IN SUDAN

Before the first World War irrigation in Sudan was almost entirely by ancient primitive methods such as the *shadouf* and *sagia*. Irrigation of the Gezira clay plains between the White and Blue Niles had been suggested as early as 1845, but it did not become a reality until 1925 with the opening of the Sennar Dam on the Blue Nile. In 1957 this dam supplied water for the 1,000,000 feddans of the Gezira Scheme. (1 feddan ≡ 1·038 acres.)

Since the second World War there has been a considerable expansion in the area irrigated by pumps. Most of the new pump-irrigation schemes grow cotton on a three-year rotation. Development has been most marked in Blue Nile Province. Here in 1947 pump schemes had 20,000 feddans under cotton providing 7 per cent of the Province's cotton production, as against 93 per cent from the Gezira Scheme. By 1956 there were 113,000 feddans under cotton in pump schemes, providing 31 per cent of the Province's cotton production, with the Gezira producing the other 69 per cent.

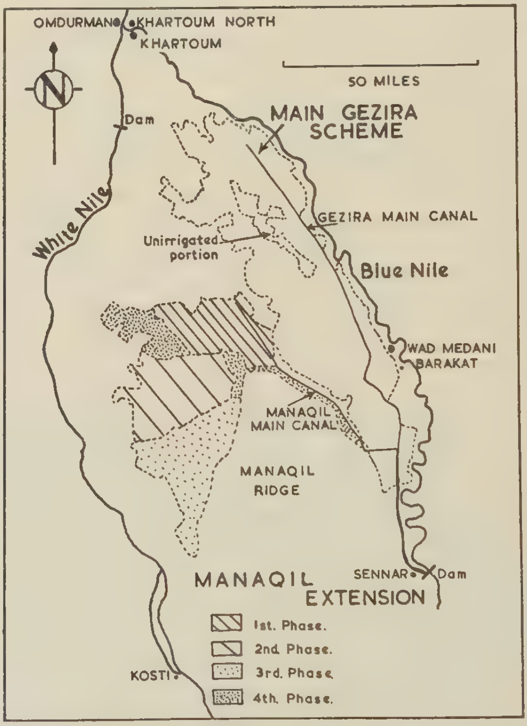
At the end of 1957 the approximate areas commanded by irrigation schemes (excluding shadoufs and sagias) were (in feddans): gravity flow—1,000,000 (Gezira only); pumps—1,200,000; basins—90,000 (basins along the Nile in Northern Province).

There are no plans for extending the area of basin irrigation, but wells are being sunk in some of the basins in an attempt to intensify the agriculture, and to reduce the wide variations in the area available for cultivation from one year to the next, resulting from fluctuations in the height of the Nile flood.

It is hoped to extend pump irrigation by a further 1,350,000 feddans, mainly along the Niles but some of it along the Dinder and Rahad Rivers, tributaries of the Blue Nile. This is being largely left to private enterprise, which is at present developing pump schemes at a rapid rate.

There are 3,000,000 feddans of new gravity flow irrigation proposed in four major schemes, two of which, comprising 2,000,000 feddans, will be watered from the Blue Nile. The first of these, the Manaqil Extension to the Gezira Scheme, is already under construction. It is being developed in four phases of 200,000 feddans each, giving a total area for the completed scheme of 800,000 feddans. The first phase was opened for irrigation on 1st July 1958. Canals for the second phase together with the new Manaqil Main Canal are now being dug, and it is due to be opened for irrigation in July 1959. The third and fourth phases are scheduled for completion in 1960 and 1961 respectively. The new main canal is necessary because the existing Gezira Main Canal has not sufficient capacity for the combined schemes. For the first 40 miles of their length the two main canals run parallel to each other and some 150 yards apart. Both start from the Sennar Dam.

The new extension is being operated on the same principles as the Gezira Scheme, with cotton as the cash crop. From 1958 the tenant farmer is to receive 44 per cent directly of the net profits and 4 per cent indirectly in Social Services; the Government is to receive 42 per cent; and the Sudan Gezira Board (a non-political national body which operates the scheme) 10 per cent. There are however two significant differences between the schemes. Firstly, in the Gezira, tenancies consist of four fields of 10 feddans each, making a total of 40 feddans. In the Manaqil Extension there are three fields of 5 feddans each, making 15 feddans per tenancy. Secondly, the Gezira four-course rotation over eight years with cotton grown on each piece of land one year in four, is being replaced by a new three-year rotation of cotton (5 feddans), dura millet and lubia fodder (hyacinth bean) (2½ feddans each), and fallow (5 feddans). Experience gained on pump schemes and in experiments on the Gezira itself shows that cropping with cotton one year in three will not damage the land, and that most tenants and their families find 40 feddans too much for them to look after without considerable outside help. Tenancies in the Gezira when they become vacant are now being reduced to 20 feddans each.



Under the Agreement of 1929, controlling the use of the Nile Waters, it is planned for Sudan to take off sufficient water to irrigate adequately only the first phase. Sudan has announced that she does not consider herself bound by the Agreement as she was not a signatory to it. She has also announced her intention of building a new dam at Damazin Rapids on the Blue Nile, some five miles above Roseires, with which to irrigate the Manaqil Extension. Its capacity will be 3 milliard cubic metres, or three times that of the present Sennar Dam. Preparations for construction are complete, but construction work has not yet started. It is intended that the new dam should replenish the Sennar Dam by controlling the flow of the Blue Nile between Sennar and Damazin. Such a large dam would store far more water than would be required by the Manaqil Extension alone, and it is ultimately intended to construct another irrigation scheme of 1,200,000 feddans (Kenana Extension) to be served by a main canal taking off from Damazin. Exploratory surveys have already been made.

Until the present negotiations for a new Nile Waters Agreement between Sudan and Egypt are completed and the new dam is constructed it is envisaged that some sort of water rationing for the combined Gezira Scheme and Manaqil Extension will have to be employed. Sufficient water is believed available to irrigate the Gezira and completed Manaqil Extension from July to the end of January, as compared with the Gezira Scheme up to 1957 from July to the end of March. Experience on pump schemes suggests that this will result in a 10 per cent reduction in the cotton yield per feddan, but this will be more than accounted for by the larger area being cropped.

The Manaqil Extension is the largest development project that Sudan has tackled since her Independence in January 1956. Sudan being an agricultural country with little proved mineral wealth, this scheme is of considerable importance. The inhabitants of the Manaqil area have depended upon a capricious rainfall of about 10 inches average per annum, with most of it falling between June and September. In consequence they have been mainly subsistence agriculturalists growing dura millet, with a low standard of living. With the coming of the scheme many of these folk will join the ranks of probably the richest peasantry in Africa—the Gezira tenant farmer. There is however a disturbing feature. The cash crop is cotton and does nothing to broaden the base of the Sudanese economy, which is dependent on this crop. In 1956, a year of good cotton yields and good prices, this crop alone accounted for two-thirds of the value of Sudan's export trade—and the present disturbed state of the Lancashire cotton industry has had repercussions in Sudan, because Lancashire is the main buyer of Sudanese cotton.

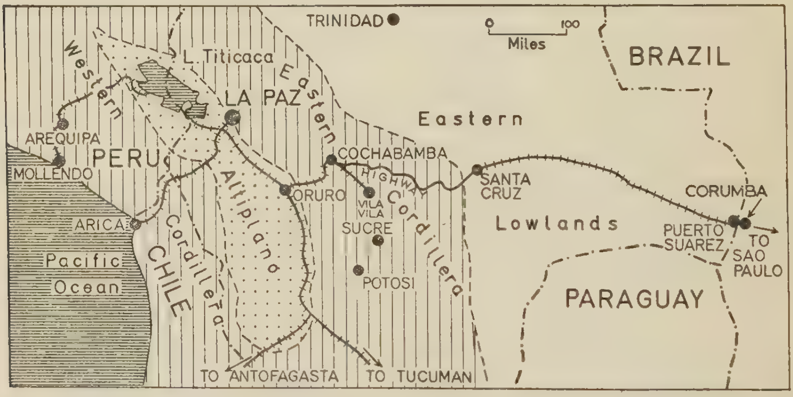
University of Khartoum. H. R. J. Davies.

THE COCHABAMBA–SANTA CRUZ HIGHWAY, BOLIVIA

The opening in 1954 of the Cochabamba–Santa Cruz highway was an important event in the history of Bolivia. Before this event the movement of goods and passengers between the altiplano and high valleys of the eastern Cordillera in the west and the lowlands in the east had been costly and difficult. The choice of transport was between pack animals and aircraft, for the narrow, winding tracks in the eastern Cordillera are mostly unsuitable for wheeled vehicles and carried almost no motor traffic. Consequently it was almost impossible to transport bulky goods between the two parts of the country and perishable commodities, such as meat, had to be flown at great cost from the east to La Paz and other Andean towns.

The rapid increase of farming population in the altiplano region of Bolivia, where conditions for agriculture are difficult and only very small areas cultivable, has made it desirable that the eastern part of the country should make a greater contribution to the national economy than it does at present. The presence in highland Bolivia of sizeable mining communities and of the fast-growing national capital, La Paz, has compelled Bolivia to import foodstuffs such as rice, sugar and vegetable oils (all of which can be produced in the eastern lowlands) from foreign countries, via Pacific coast ports. The recent decline in tin output and the consequent reduction in the value of Bolivian exports have reduced the amount that can be spent on foodstuffs abroad. In recent years, therefore, it has become more and more important for Bolivia to develop its eastern lowlands, both as a source of food and agricultural raw materials for the highland region and as an area in which farmers from the overpopulated altiplano could be resettled. According to the 1950 census of Bolivia the four departments of the eastern lowland (Pando, Beni, Santa Cruz and Tarija) had only about half a million of Bolivia's 3 million inhabitants, living in an area larger in size than France.

About forty years ago it was planned to continue the railway from the railhead at Cochabamba (reached in 1917 by a line from the railway system of highland Bolivia) into the eastern lowlands to Santa Cruz, but the track only reached Vila Vila. In 1931 work was started on a dirt road. This did carry a very limited amount of motor traffic, though it was impassable for much of the year. The present modern highway was constructed mostly by a United States firm between 1951 and 1954 at a cost of 24 million dollars, one third of which was provided by the Bolivian government, the remainder by the Export-Import Bank.



Like the central highway of Peru (linking Lima with the selva region), the Cochabamba–Santa Cruz highway is one of the most remarkable stretches of road in the world. It climbs from about 8000 feet at Cochabamba to its highest point, more than 12,000 feet above sea level, whence it gradually descends, though crossing many valleys and ridges on the way, to Santa Cruz, at not much more than 1000 feet above sea level. The total length of the road is 311 miles, but the direct distance between the two terminal points is only 186 miles. The road follows, however, the most direct route possible and much of the extra road distance is due to the need to negotiate steep slopes by means of zig-zags. During the construction of the road some 14½ million cubic yards of earth and rock were moved.

The highway has two lanes, thus allowing a constant flow of traffic in both directions. This is something of a luxury for Andean roads, many of which have only one lane, used at alternate periods by traffic in different directions. Traffic using the highway includes buses, making the journey in about 15 hours, and lorries, taking about twice that time, as well as trains of pack animals. Few private cars use it, and as there are no settlements of any appreciable size on the route, almost all the motor traffic is between the two terminal points.

At present much of the eastbound traffic on the highway consists of lorries carrying petroleum products in drums from the oil refinery at Cochabamba to the railhead at Santa Cruz for export to Brazil via Corumbá. The crude oil reaches Cochabamba by pipeline from Bolivia's newly exploited oilfield in the extreme southeast of the country. Westbound lorries carry sugar, sugar alcohol and fruit in addition, of course, to empty oil drums. So far, the average number of vehicles using the road is about 1200 per month. It is hoped that soon, as new farming projects in the lowlands progress, food will be available for movement to the altiplano in quantities large enough to enable Bolivia to stop importing agricultural produce. In time it is intended also to use the road for the large-scale migration of surplus agricultural workers from the overpopulated altiplano to the hitherto almost undeveloped eastern lowlands. Many families and individuals in the altiplano have already applied to take part in what is known as the *Marcha al Oriente* (movement to the east). Partly owing to disagreement among anthropologists and doctors as to the ability of the Andean Indians to live and work in the lowlands, with different conditions of pressure and climate, and partly owing to the many difficulties in organizing a project of this kind, the *Marcha al Oriente* has so far been largely of an experimental nature. Care is being taken to ensure that those who have already been resettled are adequately fed and their health is closely checked.

It is also worth noting that the Cochabamba–Santa Cruz highway and the railway (opened in 1955) from Santa Cruz to Corumbá, on the Brazilian frontier, complete what is now the most northerly transcontinental road and rail route across South America.

University of Nottingham. J. P. COLE.

THE FLOODS OF THE CLUTHA AND WAIKATO RIVERS, NEW ZEALAND

The largest rivers of the South and North Islands respectively have experienced some of their worst floods in the spring and summer of 1957–8. What makes these disasters especially significant is the fact that in both cases the natural storage of lakes in the upper reaches has been supplemented, in recent years, by the construction downstream of impounding reservoirs for hydro-electric power developments.

Though both the Clutha and the Waikato are relatively short (just over 200 miles) their catchment areas are large and the precipitation in their mountain courses heavy, so that they are powerful rivers with very large discharges, 330,000 cusecs for the Clutha and 130,000 for the Waikato. In most years, however, the danger of serious flooding is lessened by the evenness of their régimes. In the case of the Waikato, this is due to the even distribution of rainfall throughout the year and the natural storage of lake Taupo. The floods of February 1958 resulted from a disturbance of this even tenor by exceptionally heavy rainfall on the central ranges of the North Island. The régime of the Clutha is more complicated, owing to the fact that it passes through three very different hill regions, and receives large tributaries in all of these. In summer the flow is maintained by the melting snow and ice of the Southern Alps, and three great lakes act as natural regulators of this supply. In the middle reaches, the greatest contribution comes in spring from melting snow from the ranges of Central Otago, while nearer the coast the foothills have abundant rainfall all the year round, but with a tendency to late winter and spring maxima. Though the maximal flows are usually complementary, there is always a danger of spring floods (as occurred in October 1957) should heavy rainfall be widespread and lead to particularly rapid snow-melt in Central Otago. In any year, however, these advantages are offset by the barrenness of the upper basins, which leads to rapid run-off. This is most marked in the case of Central Otago, where the enclosed intermontane basins have a very low rainfall (13 inches at Alexandra). Prolonged burning and the ravages of gold miners and rabbits have combined to destroy the natural cover of tussock grass and convert these districts into a man-made desert.

Damage has, naturally, been concentrated in the coastal lowlands, which are extremely flat. Below Balclutha the Clutha divides into two branches, enclosing the island of Inchclutha, which is protected by dykes. Even here, however, the current of the river normally approaches 10 knots, and retaining walls are of little avail against the savagery of the Clutha in flood. The lowlands of the Waikato are much more extensive, and besides the alluvium brought down by the rivers they include large areas of reclaimed peat swamp at a very low level. The huge volume of pumice dust from the Central Volcanic Plateau brought down by the main river has blocked the mouths of the tributary streams in the lowlands, ponding them back into lakes, so that a rise in the main river has serious repercussions on their discharge. In addition, the mouths of both Waikato and Clutha are partially closed by sand-bars, that of the Clutha being the greater obstruction.

Though the floods of the Clutha, with its high speed and enormous discharge, are by far the more spectacular, those of the Waikato are much more disastrous in terms of the area affected and the economy of the Dominion. The lower Waikato is probably economically the most important single region in New Zealand, because it is the richest dairying district and contains the second largest coalfield in the country. The river itself, with four hydro-electric stations in operation, provides over half the electricity of the North Island, a proportion which will rise to nearly 90 per cent in the future with the completion of six more stations.

It is therefore fortunate that a repetition of the floods is less likely in the Waikato. Preventive measures are also possible, in the form of extra storage provision, wider planting of State Forests, dyke defences against the gentler stream, and perhaps clearing of the harbour bar for small shipping which still uses the port. The Clutha presents a much more intractable problem. In the first place, extra storage is well-nigh impossible to achieve. Only one of the natural lakes, Hawea, can be increased in capacity, and this has already been undertaken. At Wanaka, borings put down by the State Hydro-Electric Department penetrated 400 feet of gravel without reaching bedrock on which a dam could be founded, while at Wakatipu, raising of the level by a dam at the Kawarau outlet would put a great strain on the natural morainic barrier at the true foot of the lake at Kingston, and would drown the flourishing tourist centre of Queenstown. Of the three gorges in the middle reaches, the Roxburgh dam already occupies the middle gorge, and its height had to be restricted to protect the town of Alexandra at the upper end of the resultant reservoir. The upper gorge is even less happily placed in relation to Cromwell, and contains the only frost-free orchard land in Central Otago. The lower gorge has similar difficulties with the basin upstream, and, being wide, would be prohibitively expensive to dam.

At the same time, soil erosion and its effects on run-off are likely to remain grave threats. The climate is too dry for the growth of extensive plantations, and, while the tussock grass is gradually creeping down from the rainier areas of the ranges with the elimination of rabbits and more imaginative control of burning, its regeneration on the lower slopes and basin floors is probably impossible. Biological evidence seems to point to the fact that before the *pakeha* settlement the tussock grass was already out of balance with its environment, and was able to persist only because of the delicate micro-climatological adjustments within the climax vegetation. Finally, the Act setting up Catchment Boards failed to repeal the Goldfields Act, which gives goldmining (fortunately, from this point of view, a declining industry) precedence over all other interests in a Declared Goldfield.

Lanarkshire County Planning Office, Hamilton. E. L. ELLIOTT.

Land Form Survey

A LETTER FROM THE EDITOR

During the summer of 1958 many letters have been received in response to the invitation which I gave in connection with the article by Mr. R. S. Waters on Morphological Mapping in our January 1958 issue. They reveal a great measure of interest in the project and certainly encourage further activity. Broadly there have been three kinds of response. Some University departments have indicated that they have this summer begun to apply in their home areas the techniques described by Mr. Waters. This is excellent news and we invite them to submit some of their completed maps with their comments and criticisms as the basis for the further discussion which must necessarily precede the initiation of a Land Form Survey of Britain. From many individuals, well qualified to speak, have come criticisms. While some of these arise from possible misunderstanding of Mr. Waters' exposition or his intentions others are criticisms of substance which need to be discussed, and it is planned that an opportunity for this will be provided during the Annual Conference (1958–9) in London. The third kind of response is the offer of assistance by people willing to undertake some morphological mapping in their home area, either themselves or, if they are teachers, with the help of their sixth formers. A letter explaining the developments envisaged has been sent to all those who made such offers.

Please address all future correspondence on morphological mapping or the proposed Land Form Survey to Mr. R. A. G. Savigear, at Geographical Association headquarters office. It is appropriate, now that Mr. Savigear (of the University of Sheffield Department of Geography) is back in this country after spending a year in West Africa, that he should take charge since, although several helped in the early development of the idea, the fundamental technique of mapping all breaks and inflexions of slope which Mr. Waters described was developed originally by him in the course of his work on slope development. He has also supervised the mapping carried out by students at Sheffield between 1948 and 1957 when the technique was tested and refined. In dealing with correspondence he will remain in close contact with Mr. Waters who has already been associated with him in the field demonstrations of the technique to the Geographical Association and the British Association for the Advancement of Science. Although I myself will be overseas until the autumn of 1959 I hope to be informed of developments as they occur and to assist in any way I can. To all those who have written to me on this matter I tender my very sincere thanks; to all those who are either interested or critical but have not written I say—please write soon.

David L. Linton

Ordnance Survey Tourist Maps

The third new Tourist sheet* is a magnificent map and one that will provide pleasure and profit for everyone who uses it, be he Wolf Cub or geomorphologist. The area it covers includes the Moors, the Cleveland and Hambleton Hills, the Coxwold—East Gilling rift and the virtually continuous cliffs of the coast from Loftus to Scarborough.

The style of the map is that of the O.S. Seventh Series maps, with the same clear and beautiful writing and using the same conventional signs. An improvement on the two previous Tourist maps recently published (Peak District and the Lake District) is the tinting of the woodland in green. This is important in the present map because of the fact that State Forests are a major element in the scenery of the southern side of the North York Moors. Two other shades of green are used, one as infilling of land below the 200-foot contour, the other to show the boundaries of the National Park. All three colours are quite distinct even where they coincide; a remarkable feat of printing. The retention of the 50-foot contour interval makes this map superior to that of the Peak District, and here it is particularly welcome as a number of fluvo-glacial channels, even minor examples like slacks or swangs, can thereby be detected in the Moors and on their western flanks. The restriction of the green lowland-tinting to land below 200 feet is another praiseworthy feature in comparison with the Peak District map (tinted green up to 700 feet) and even with the Lake District map (up to 500 feet). The differentiation of the really low land is of value in this area; it helps to distinguish the physical regions.

The relief of all but the land under 400 feet† is depicted with admirable success by a combination of layer-colouring (in tones of apricot) and hill-shading (light violet shadows on the slopes to the south and east). The shading is cleverly done; very lightly tinted so that the "blueness" is cancelled out in the shadows at higher altitudes by the stronger layer-colouring, and yet fully adequate to give the appearance of solid modelling and also to prevent any misreading of the contours as "terracing". This lightness of shading preserves the whale-backed form of the moorland tops and precludes their being seen as narrow ridges. With all this colouring and contouring the map is printed with such lucidity that the writing and signs are at least as easy to read as in the Seventh Series one-inch maps.

---

* **Ordnance Survey One-Inch Tourist Series, North York Moors.** 40 × 32 inches. Paper flat 4s., folded in covers 6s.; mounted on linen and folded in covers 8s. 6d. July 1958. Ordnance Survey Office, Chessington.

† The Peak District map has no hill shading below 900 feet.

There is a compelling three-dimensional effect that comes very near indeed to being a true picture of the relief. Not only the shapes but also the relative volumes of the components of relief are unmistakable. Attention is drawn by the layer-colouring to the existence of scattered remnants of surfaces at certain levels. The winding trough-like form of many of the valleys is forced on one's notice. The map brings out dynamically the spectacle of dissection in progress, with some of the outliers beautifully rendered in their conical form. For these reasons alone this is a document that challenges thought.

Where this tool at the hand of the geographer is so helpful it may seem ungracious to touch on the possibility of improvement. One wonders whether hill-shading may not be extended with benefit down to the 200-foot contour.

In the teaching of geography, the map will be of the greatest value, largely because of the relative simplicity of the landforms of the area and of their relationship to the geological structure. Would the Ordnance Survey Office consider publishing, at a comparable price, a companion geological map of the whole area at the same scale, with the prospect of a large sale to the public as well as to schools and colleges? The two maps together could be most valuable contributions to education. For the present topographic sheet alone, however, the Ordnance Survey is to be congratulated on the production of a triumph of cartography.

F. J. CAMPBELL

The following notes on the production of the O.S. Tourist Maps have been received in a letter addressed to the Editor from Brigadier L. J. Harris, Director of Map Production and Publication of the Ordnance Survey, in response to the publication in *Geography* of the review of the Lake District sheet in the April 1958 issue and of the above notice.

> "At the present time the Ordnance Survey is using the isolated sheets of the One-inch Tourist Series to develop the technique of hill-shading and to test the reaction of the public to this type of relief depiction. Three such sheets have been published recently. In two of them, the Peak District and North York Moors, a combination of layers and partial hill-shading has been used, while in the third, the Lake District map, hill-shading alone has been used above 500 feet. It is not intended that the same type of relief depiction should necessarily be employed in all sheets of the Tourist Series. The system employed will depend on the nature of the terrain.

In reprints of both the Peak District and the Lake District sheets the woodlands have been shown in green; and in the reprint of the Peak District sheet, contours have been shown at 50-foot intervals.

The next sheet in this series, to be published in March 1959, will be the Lorn and Lochaber sheet covering the area from Oban to Ben Nevis. It is intended that the same type of relief depiction will be used on this sheet as was used for the Lake District. In its production the three points made in your review concerning the shapes of hill tops, the relative heights of the mountains, and the rock features and changes of gradients on the shadow sides of the hills will be kept in mind. Good air photography, which is not available for the Lake District map, and the experience gained from the production of this map, should improve the quality of the hill-shading both in shape and gradation."

The Geographical Association

SUMMER SCHOOLS 1958

Two courses of very active field work were held in 1958, one in Scotland and one in Germany. The leaders of the Scottish course were Professor J. W. Watson, Professor D. L. Linton and Mr. R. W. Galloway, who provided a stimulating course of work in Angus which combined town and historical studies with physical studies in the Cairngorms.

Tuition during the German course was in the very capable hands of Mr. T. H. Elkins and Dr. E. M. Yates who led studies of the agricultural and industrial landscape of Lower Berg and the Ruhr-Ems area and of the Eifel volcanic districts. We are grateful, too, to Dr. Erika Wagner, vice-principal of the Kettwig Pädagogische Akademie for enabling us to obtain very satisfactory residential facilities and for her discussion of German geography teaching with members of the course.

SUMMER SCHOOLS 1959

Notices of two courses have already been circulated to members: Summer School of Mediterranean Studies and Summer School of Alpine Studies. The leader of the first course will be Dr. J. M. Houston of the University of Oxford; the leader of the second, Mr. R. C. Honeybone of the University of London Institute of Education. The number of places on each course is strictly limited and applications for places should be sent without delay. Further copies of programmes and application forms can be supplied from headquarters office.

SPRING CONFERENCE 1959

The Spring Conference will be held at Leicester from 31st March to 4th April 1959 under the direction of Professor Norman Pye and with the assistance of the Leicester Branch of the Association. The programme and registration forms will be sent to all members in January, after which applications should be made as quickly as possible. Accommodation will be at Beaumont Hall, University of Leicester.

INCOME TAX RELIEF ON SUBSCRIPTIONS

The Commissioners of Inland Revenue have approved the Geographical Association for the purposes of Section 16, Finance Act 1958, and commencing with the year ending April 1959 the whole of the annual subscription paid by members who qualify for relief under that Section will be allowable as a deduction from

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GIFTS AND COVENANTED DONATIONS

We acknowledge very gratefully donations from the following members and branches in the period October 1957 to November 1958.

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A few donations, paid during the Annual Conference anonymously, cannot be acknowledged here by name. Covenanted donations are indicated by *.

NORTH AND LATIN AMERICA: CATALOGUE

The third part of the catalogue of the Association's library is the largest so far published—52 pages, covering the American continent. Like its predecessors (*Africa* and *Asia*) the catalogue is useful also as a reference list for background reading, for instance for "A" level students who have limited local library facilities. Orders for this catalogue should be sent to headquarters office; the price is 3s. 6d. (post free) to members, 4s. 6d. to non-members. Copies are supplied automatically to members who have standing orders for the library sectional catalogues; new standing orders can be accepted at any time and back issues of the catalogue for *Asia* (2s. 6d.) and *Africa* (2s.) can still be supplied.

Teaching Geography in Junior Schools

This entirely new booklet, prepared by a joint committee of the Primary Schools and Training Colleges sections of the Association, supersedes *Geography in the Primary School*. It has line drawings, photographs and an extensive appendix of book lists, including references for sample studies and background reading, and is a useful handbook for teachers concerned with geography for children up to 12 years. Advance orders for the booklet (to be ready in February 1959) should be sent direct to headquarters office.

FIELD STUDIES COUNCIL

The address of the headquarters of the Field Studies Council is changed to 9 Devereux Court, Strand, London W.C.2. The programmes of the Council's courses at its five centres in 1959 and details of bursaries can be obtained from the Publicity Secretary, F.S.C., Ravensmead, Keston, Kent.

PETROLEUM INFORMATION BUREAU

Recent information leaflets published by the P.I.B. include clear location maps and are on oil in Latin America, in Britain and in the U.S.A.; the World's Oil Reserves and Oilfields of the Commonwealth. They are obtainable free of charge from P.I.B., 29 New Bond Street, London W.1.

Reviews of Books

With very rare exceptions books reviewed in this journal may be borrowed from the Library by full members and student library members of the Association.

The World of the Soil. The New Naturalist series no. 35. Sir E. John Russell. 15·5 × 22·5 cm. xiv + 237 pp. London: Collins. 1957. 25s.

The Land Called Me. An autobiography. Sir E. John Russell. 14·5 × 22·5 cm. 286 pp. London: George Allen and Unwin Ltd. 1956. 25s.

Three years ago in *Geography*, November 1955, a review was published of E. J. Russell's *World Population and World Food Supplies*. The two titles considered here are the second and third important books our former President has written since his 81st birthday, quite apart from numerous scientific articles—an appropriate continuation of a long life of distinguished service to mankind. In writing of *The World of the Soil* one is also happy to remind geographers of the man behind the book, in Sir John Russell's autobiography, published two years ago. In the late nineteenth century the power of money restricted opportunity, and the son of a Unitarian minister had a severe struggle, some aspects of which are described without bitterness in *The Land Called Me*, a title which brings out the wonderful fact that a city-bred lad became one of the founder-fathers of modern farming. With his friend (Sir) Daniel Hall, Russell surveyed the soils of southeast England and probably the most vital contribution of their famous classic (1911) was the discovery of the important role of micro-organisms in the soil, thus correcting old crudities based mainly on estimation of minerals alone. The new book, appropriately called *The World of the Soil*, brings out Russell's lifelong plea for studying the soil in the first instance for its own sake. This is the only way to achieve its better utilization for the important task of growing food to raise increasing hundreds of millions above semi-starvation, disease and consequent incapacities. The survey of the progress of soil study necessarily includes what Rothamsted has done under Hall and then under Russell and his successors, and no account of that progress could be complete without several references to E. W. Russell, which a father must have enjoyed having to insert.

The soil book is one which should be widely read by geographers, and especially by teachers. It demands serious attention, but Sir John is such a skilled expositor, as our Association has had so much occasion to know, that technicalities are not allowed to obscure meaning. The development of soil structure and the part played by colloids and bacteria in that process are fascinatingly discussed, while the discovery of the importance of infinitesimal traces of rare elements, such as molybdenum, is almost a romance. All the while, Sir John remembers the old values in traditional farming. He and Hall may be said to have transformed arable farming and he refers loyally, as an old Aberystwyth student, to the transformation of grassland farming by the Aberystwyth Plant Breeding Station under Sir George Stapledon. From *The Land Called Me* we glean that India, parts of East Africa and America, the U.S.S.R., Australia and New Zealand have also profited by advisory visits from this apostle of food-production and of the fight against want and its attendant discords.

H. J. F.

A Survey of Whitby and the Surrounding Area. Organized and edited by G. H. J. Daysh. 22 × 28·5 cm. xv + 254 pp. Wallet of additional maps and chart. Windsor: The Shakespeare Head Press. 1958. £3 3s.

The complete refutation of recent direct attacks on our subject can be found in the practical application of modern geographical method in local survey. The post-war development plans, the British Association handbooks of the last decade, and now this magnificent volume on Whitby should dispel any reader's doubts as to the respectability of his calling.

On the occasion of the jubilee of Whitby Urban District Council and under the patronage of the Marquis of Normanby, a team of three geographers, an economist, one surveyor and a geologist under the editorship of Professor Daysh has compiled an almost complete appreciation of the origins and functions of the resort and an analysis of its present problems. Their conclusions are valid for several other east coast centres of similar size and economic structure too remote for growth as residential centres, with fishing and local manufacture in decline, yet with the necessity of providing essential services in a rural hinterland of large size (400 square miles).

The analysis and presentation of *A Survey of Whitby* are of the highest order and it is possible to become completely absorbed on turning to any page. In so thorough and monumental a study it is perhaps unreasonable to complain of omissions and the lack of any urban climatology can be excused by the paucity of records and the absence of any bases for comparisons. But the omission of a more thorough survey of the site of the town, its subsoils, angles and aspects of slope restricts the fullest comprehension of the account of historical growth and of the large-scale maps of urban morphology and land use. Some adequate link is required between these maps (at a scale of 1 : 2500), the map of dominant geological elements (scale 1 : 21,120) and the relief map (scale approximately 1 : 30,000), the aerial obliques, and the cursory description of site in the introduction to the growth of Whitby (pp. 51–3). A proper morphological assessment of site values would require equally large-scale treatment at 1 : 2500, as an extra sheet or as an overlay and a thorough genetic classification and description after close co-operation between geologist and geomorphologist.

Despite this drawback to the complete appreciation of one's setting within the urban veneer, and despite the lack of any helpful index, holidays in Whitby will in future be all the more enjoyable, and those who have never been are likely to go there for certain after handling so finely produced and spirited a work.

R. W. C.

The Geography of the Port of London. James Bird. 12 × 19 cm. 207 pp. London: Hutchinson University Library. 1957. 10s. 6d.

In this latest volume of the Hutchinson University Library series, Dr. Bird has had the unenviable task of trying to compress a vast subject with its abundant literature into less than 200 pages. He has succeeded in covering the ground but only at the expense of producing a book which is more encyclopaedic in its content than a text for the general reader. One may find some of the physical geography in the introductory section rather indigestible and not of prime importance to the understanding of other aspects of port geography developed later. The one salient feature of the physical geography which has had a direct bearing on the more recent growth of the port, namely the presence of sunken channels beneath the present river bed allowing easy dredging, is not mentioned.

After the physical introduction, the historical development of the port is considered, followed by a detailed section on the docks and riverside wharves. The most readable section of the book, covering the industrial development of lower Thameside, will already be familiar to readers of *Geography* (see vol. xxxii, 1952). Undoubtedly the main value of the book lies in its up-to-date statistics and its extensive list of references for readers who wish to follow up the details of the various aspects of the geography of the port which are not fully covered in the text.

A. H. W. R.

The Norfolk we Live In. P. W. Blake, J. Bull, A. R. Cartwright and A. Fitch. 8·5 × 24·75 cm. 80 pp. + map end-papers. Norwich: Jarrold & Sons Ltd. 1958. 5s. 6d.

In this useful book, four members of the staff of the City of Norwich School present in systematic form the materials they have assembled for the teaching of local studies. The information is arranged conveniently in forty concise chapters, of which about half contain a geographical element. Topics are dealt with "from the ground up", sections on the geology, physical geography and sub-regions of the county serving as a basis for discussions of the development of the Norfolk landscape at successive historical periods. Purely historical chapters are devoted to such topics as Norwich cathedral priory, the Pastons and Kett's rebellion. A separate chapter on climate might be added to the first part of the book with advantage. The second part contains descriptions of the principal Norfolk industries, the processes involved being discussed in detail. The book concludes with a summary of regional detail omitted from the systematic treatment, and a chapter on local government. There is a full bibliography.

The numerous sketch-maps and line drawings which illustrate each chapter are excellent, and provide a rich source of blackboard material. In contrast, the coloured end-paper maps, extracted from a standard school atlas, are distinctly conventional; considerations of cost doubtless forbade the preparation of special maps. The book is suitable for use in primary and all types of secondary schools, and is inexpensive and durable enough to serve as a class text. Certainly no school in Norfolk should be without it, and it deserves to be widely adopted as a regional source-book by schools elsewhere. Authors and publisher are alike to be congratulated upon their enterprise in producing it.

P. J. M. B.

The World We Live In. Wall map issued by Barclays Bank Limited. 1958.

Barclays Bank Limited has recently published under the above title a coloured wall-sheet, 29½ × 40 inches, depicting, on an Atlantis projection of the world, population distribution, population statistics of "urban agglomerations", air and shipping routes and antarctic bases. The map and the 14-page text which accompanies it have been compiled by Professor D. L. Linton, who has summarized the history of exploration, the physical pattern of the earth and the growth of world population. He discusses the problems of population pressures and food resources and the challenge of a rapidly changing world. Map and text provide the kind of material on which a "population project" could be based; both suggest topics—historical, physical, economic and social—which could be followed up in reference books and encyclopedias.

The folded sheet has the text printed on the reverse side; or the map can be supplied as a wall edition on canvas-backed paper with Professor Linton's essay printed as a separate leaflet. Both types will be supplied free of charge to schools from Barclays Bank Limited, 54 Lombard Street, London E.C.3.

M. O.

Eurasia and Australasia: Geography for Secondary Schools. Vol. IV. E. Ford and B. Rowe. 16 × 24·2 cm. 467 pp. London: Angus & Robertson. 1958. 30s.

Advanced Level Geography. Book 1. Australia and New Zealand. Pt. 1 Australia, 296 pp., 15s. Pt. 2 New Zealand, 155 pp., 8s. D. C. Money. London: University Tutorial Press. 1958.

Longmans Australian Geographies. No. 1 The Snowy Mountain Scheme; No. 2 The Hunter Valley; No. 3 The Barkly Tableland; No. 4 The New England Plateau; No. 5 Indonesia; No. 6 The Darling Downs; No. 7 New Guinea; No. 8 The South West; No. 9 Tasmania. 40 pp. each. Melbourne: Longmans Green & Co. 1957. 4s. 9d. each.

If the idea of lumping together Europe, Asia, Australia and New Zealand in one textbook seems unconventional or even eccentric, it must be remembered that Messrs. Ford and Rowe's *Eurasia and Australasia* has been written for Australian schools, and that it is one of a series that already includes a volume on *Africa and the Americas*. While the treatment of Eurasia will be of interest to teachers here for its novelty, it is the last 248 pages, on the authors' own area, that is likely to earn this book a place in school libraries. Australia is treated systematically rather than regionally and the text is authoritative, detailed and up to date. The maps, drawn by Edgar Ford, are excellent and will repay careful study. Teachers will find the sets of exercises useful.

Mr. Money has written an orthodox "Advanced Level" textbook for British schools, conveniently divided into separate volumes on Australia and New Zealand, the latter including a chapter on the island dependencies of both dominions. Both parts are very well illustrated with maps and photographs (including many aerial obliques). Each part has a full bibliography. Like Edgar Ford, Mr. Money has drawn on the *Atlas of Australian Resources* for many of his maps. The treatment is both systematic and regional, without being repetitive. While one could point to occasional errors on points of detail, these hardly detract from Mr. Money's achievement in writing a most useful textbook.

Longman's *Australian Geographies* are a series of regional studies, edited by Graham Lawton of the University of Adelaide, and intended primarily for use in Australian schools. This accounts for the inclusion of a detailed account (No. 1) of the Snowy Mountains hydro-electric scheme and of Donald Fryer's booklet (No. 5) on Indonesia, a reminder of Australia's anxious concern with the "Near North". Fryer's opinion of Java is worth quoting: ". . . a poverty-stricken land and . . . a great burden on the Indonesian economy. It contributes very little, apart from sugar, to the export trade of the country, and consumes most of the imports". Apart from John Andrew's "New Guinea", the other booklets deal with a selection of Australian regions. Good regional studies of Australia have long been needed, and the appearance of this series is more than welcome. Other titles are promised, and will be eagerly awaited.

It is unlikely that the series will ever give a complete coverage of the continent: Australia does not lend itself to the "jig-saw" type of regional subdivision. Nevertheless, these studies of contrasting areas offer useful examples of characteristic landscapes.

J. S. D.

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